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M O S Q U E   A R C H I T E C T U R E

BY

H A S S A N   F A T H Y

In search of Identity.

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# M O S Q U E   A R C H I T E C T U R E

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## Introduction

- 1    In this everchanging world of things, man is in need of relating himself to some fixed point of reference to get out of chaos into cosmos. He has ever/been seeking means to situate himself in space, time and the world of spirit and the mind.
- 2    Spacially, man used the polar star to find his bearings; geographically, he related himself to some holy place such as Mecca, Jerusalem or Rome.
- 3    In time, he reckons on outstanding events in history such as the birth of Christ and the Hejra of Mohammad.
- 4    In the world of the spirit and the mind, he has been ever looking for what is immutable within change beyond the material form or truth, having recourse to the three tributaries of knowledge; intuition and faith, philosophy and science.
- 5    From early times man intuitively created symbols, making abstraction of the form and penetrating into the inner meaning that this form carries. In the past, he drew these symbols through the observation of natural phenomena by analogy and psychological association of ideas, and by sensing the forces that are working in shaping form and the principles of creation that commanded these forces.

- 6 For instance, the elephant was considered a cosmic animal; cosmic because he is the animal with a spherical structure symbolizing the sky, carried by four pillars symbolizing earth. This evocative structure has made the turtle the sacred animal for people of central Asia, because the turtle swimming on the primordial waters has an arched back materializing the celestial dome and she is square below, having four oriented pillars symbolizing earth.

Figs. 1-2

- 7 The same idea has led to taking the structure with a dome sitting on a square plan in Byzantine churches to represent a microcosm. The dome on pendentives towering over the space below, symbolized the sky with the figure of Christ pantocrator in the middle dominating the whole space and containing the heavenly Jerusalem, embracing earth below. So, the church represented a microcosm complete in itself with earth and sky enclosed within.

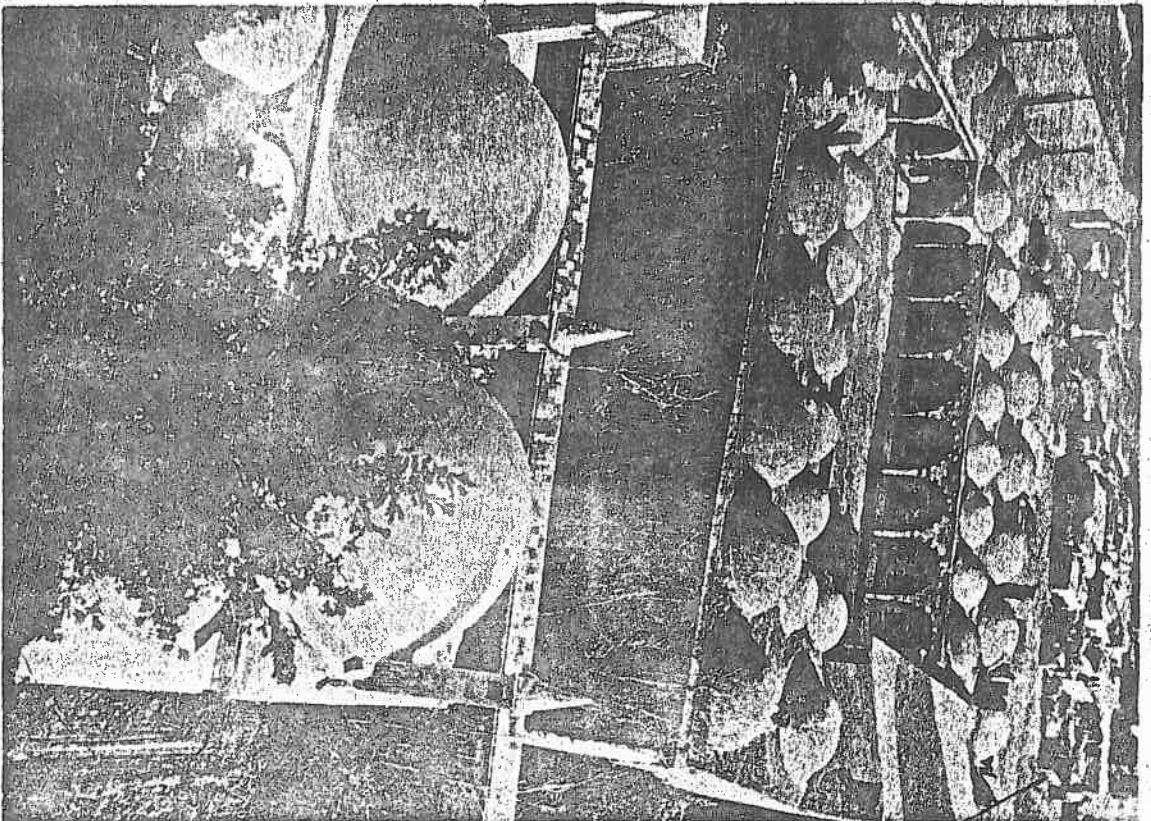
- 8 In Islamic architecture, the symbol of the dome is different from the Byzantine according to the faith. The sanctuary being outside its walls, there in Mecca, the mosque is not an isolated microcosm complete in itself. It is a clean and quiet place for the prayers under the sky. If the worshippers were to be protected from the elements under a roof, this roof should not cut them off from the holiness of the sky and the same symbol of dome was used in certain parts, but here, the Byzantine dome was substituted by the Sassanid dome on squinches in which the square is transformed into an octagon and the octagon into the circle expressing movement upwards with the eight sides of the octagon symbolizing the eight angels carrying the throne of God.

Figs. 3-  
4-5

In this way, the descending movement of the pendentives is replaced by an ascending movement by these consecutive transitions pointing upwards towards the real sky.



FIG. 1 Cosmic Turtle



*Damascus - Telie Sultan Selim*

FIG. 2 Domes



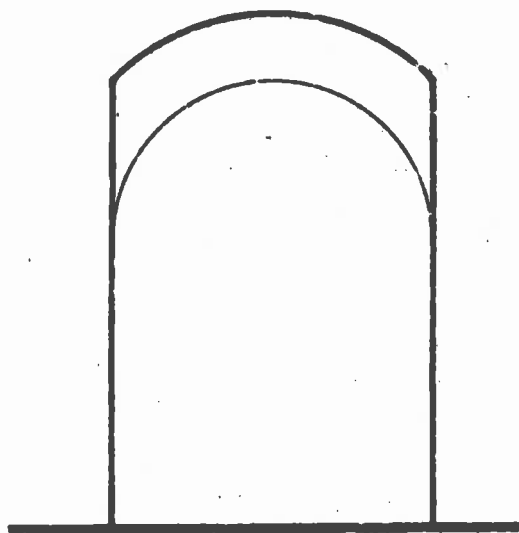
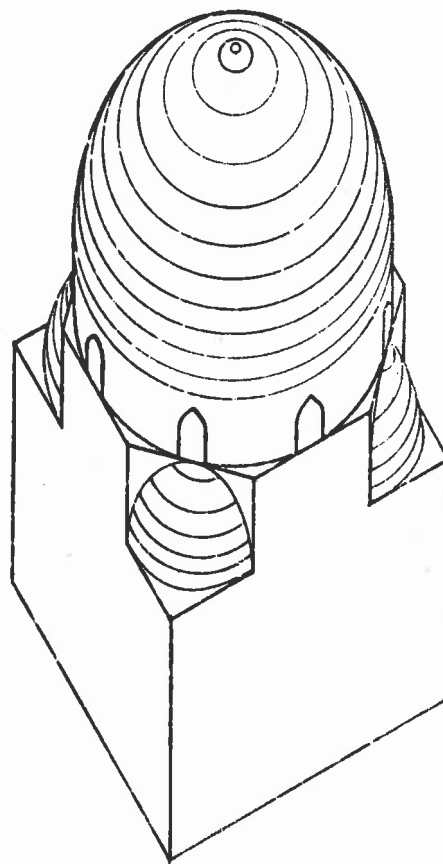
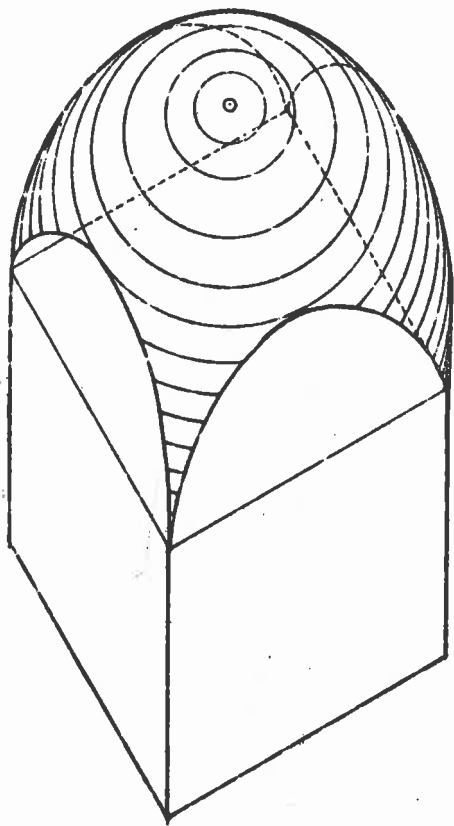


fig. 3

BYZANTINE DOME  
(ON PENDENTIVE)

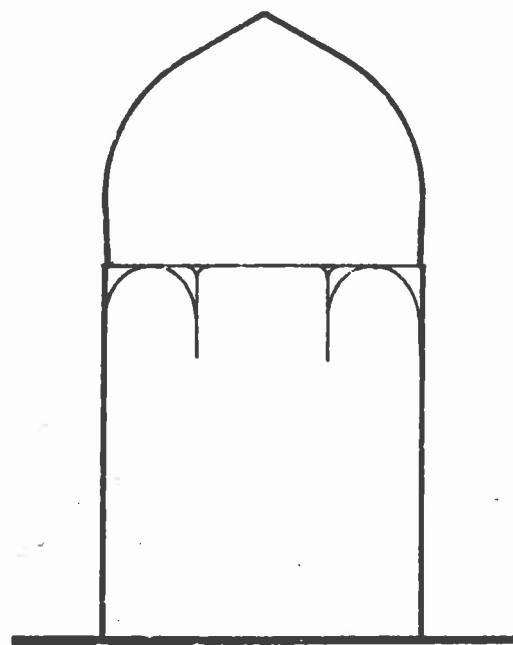


fig. 4

SASSANID DOME  
(ON SQUINCHES)

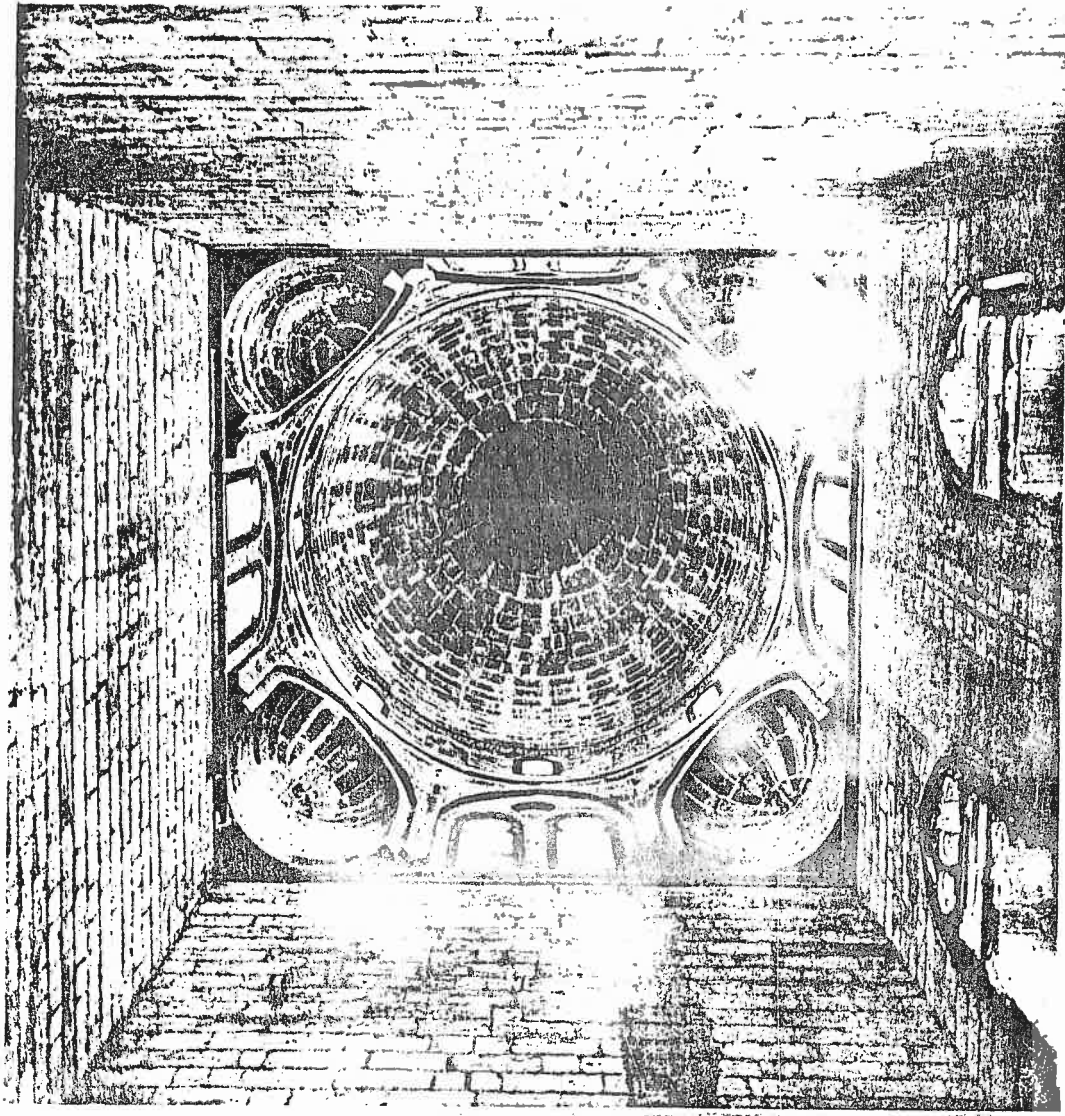


FIG. 5

Sassanid Dome seen  
from below

- 9 Still, the spherical form of the Sassanid dome as seen from the exterior would seem to descend and to close on itself. This effect is corrected by giving the outer surface of the shell the curve of a pointed arch.

Fig. 6

More than that, in Egyptian mosque architecture, the shell of the dome is drawn slightly narrower at the bottom suggesting the sphere to be flying in the air.

- 10 In the Iranian and the architecture of central Asia, this effect is more accentuated than in Egyptian architecture and the dome takes the form of a bulb.

- 11 Lightness and ascension of the dome are accentuated by sculpturing the outer surface of the dome with plant and foliage patterns. In the first case, the cactus with ribs is chosen for its spherical form. For the foliage, the surface is carved in interlacing and geometrical patterns expressing growth upwards. The plant is considered the symbol of the will to grow, shooting up against gravity, breaking even the rock.

Figs. 7-8

Fig. 9

In Iranian architecture the dome is inlaid with coloured ceramics with the same foliated, decorative patterns.

Fig. 10

- 12 In ancient Egypt, every natural form, be it a mountain, a plant, an animal, or man himself, was supposed to be a microcosm incarnating some principle of creation which they called 'Neter'. They tried to rule their temple architecture by projecting the Neters onto their design and we have, for example, the temple of Horus, the hawk, in Edfu; the temple of the cow, Hator, the goddess of the sky, in Dandera, and the temple of man in Luxor.

The hawk flying in the sky is associated with the air; the cow giving milk is associated with the sky giving rainwater to grow the plants, giving life to the dead earth, and man microcosm incarnating all the Neters that are projected on the plan and architecture of the temple of Luxor.

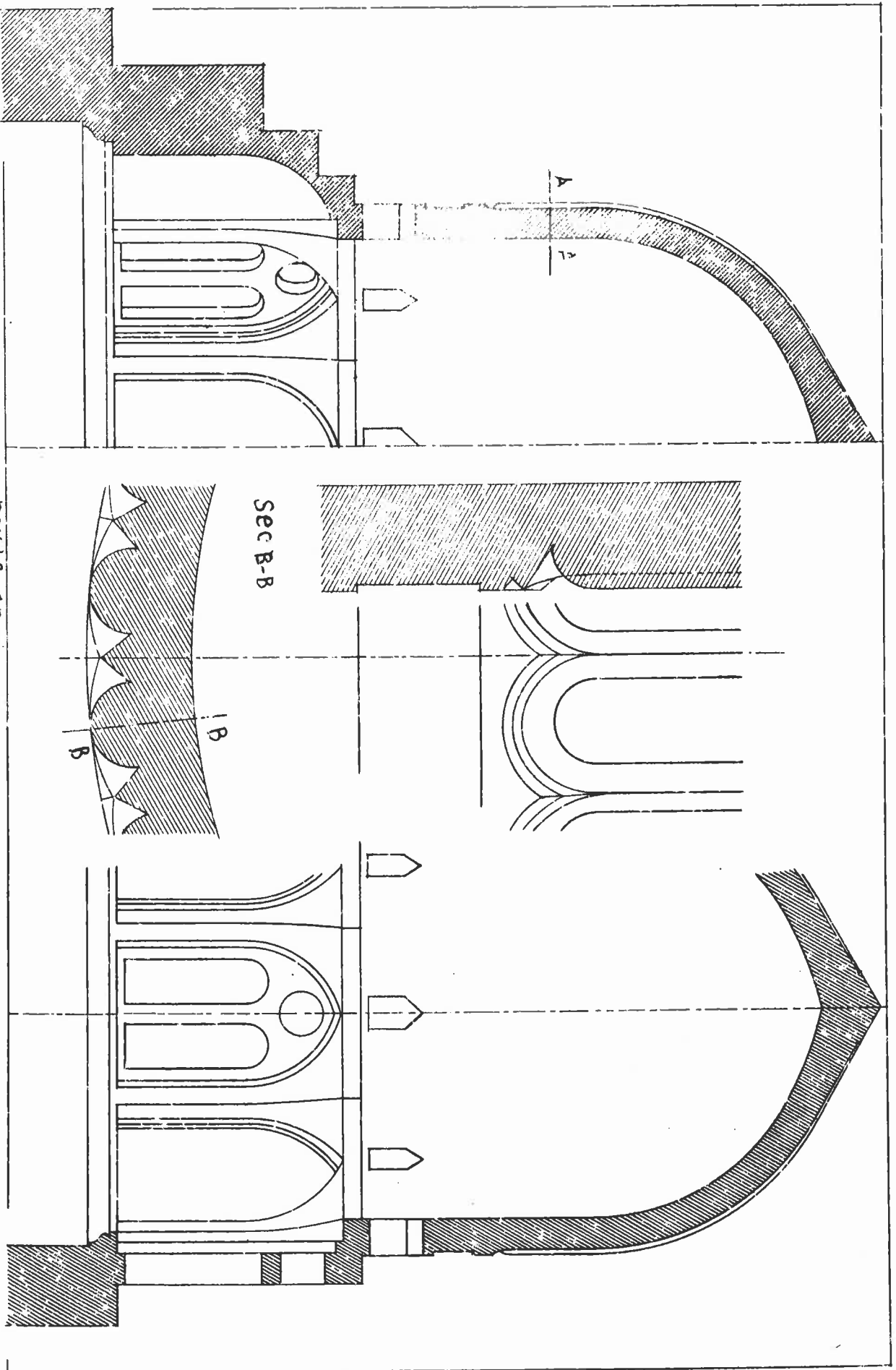


FIG. 6 Profile of dome pointed arch

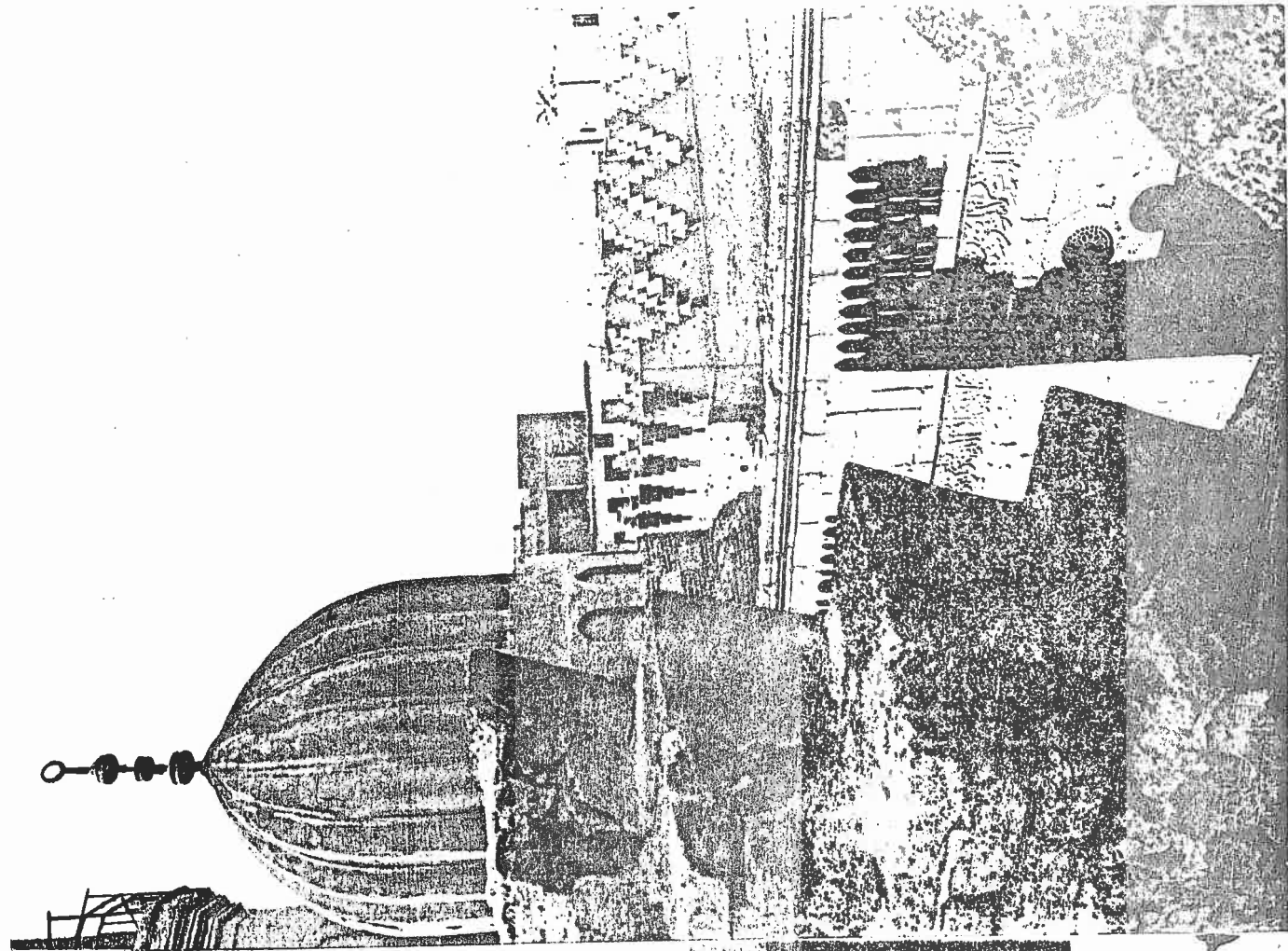


FIG.8 Ribbed Dome

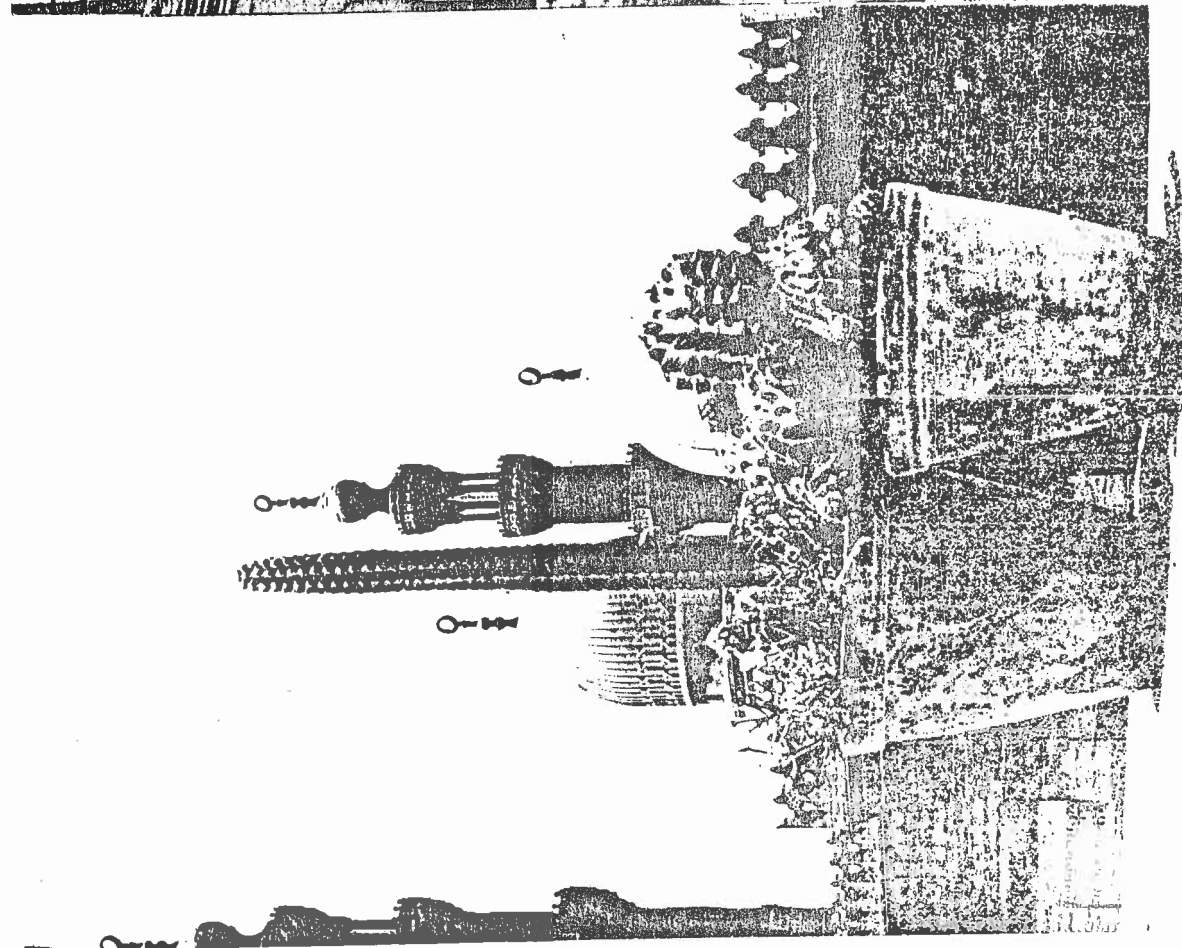


FIG.9 Cactus

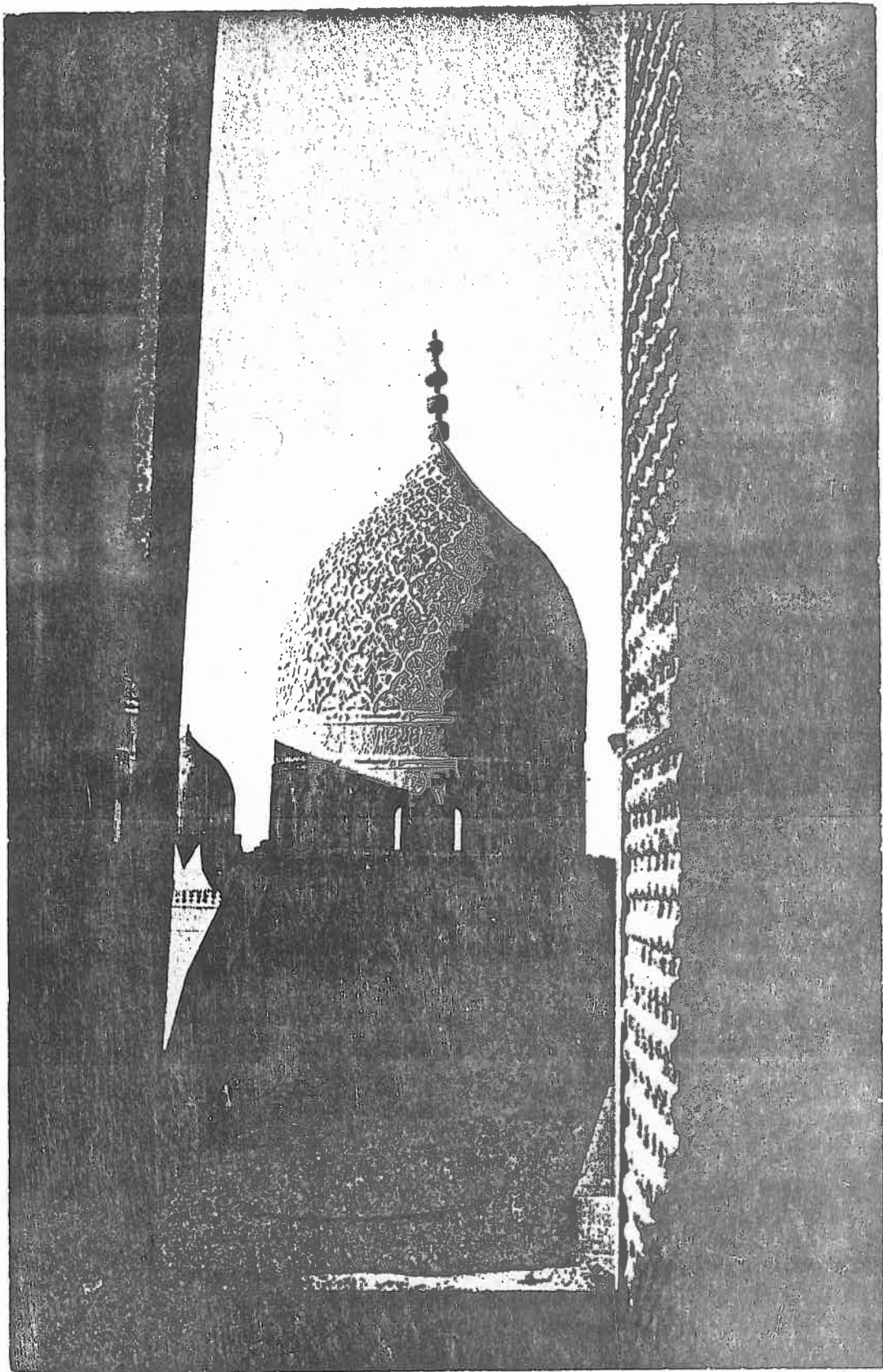


FIG. 9 Dome of Kanebay



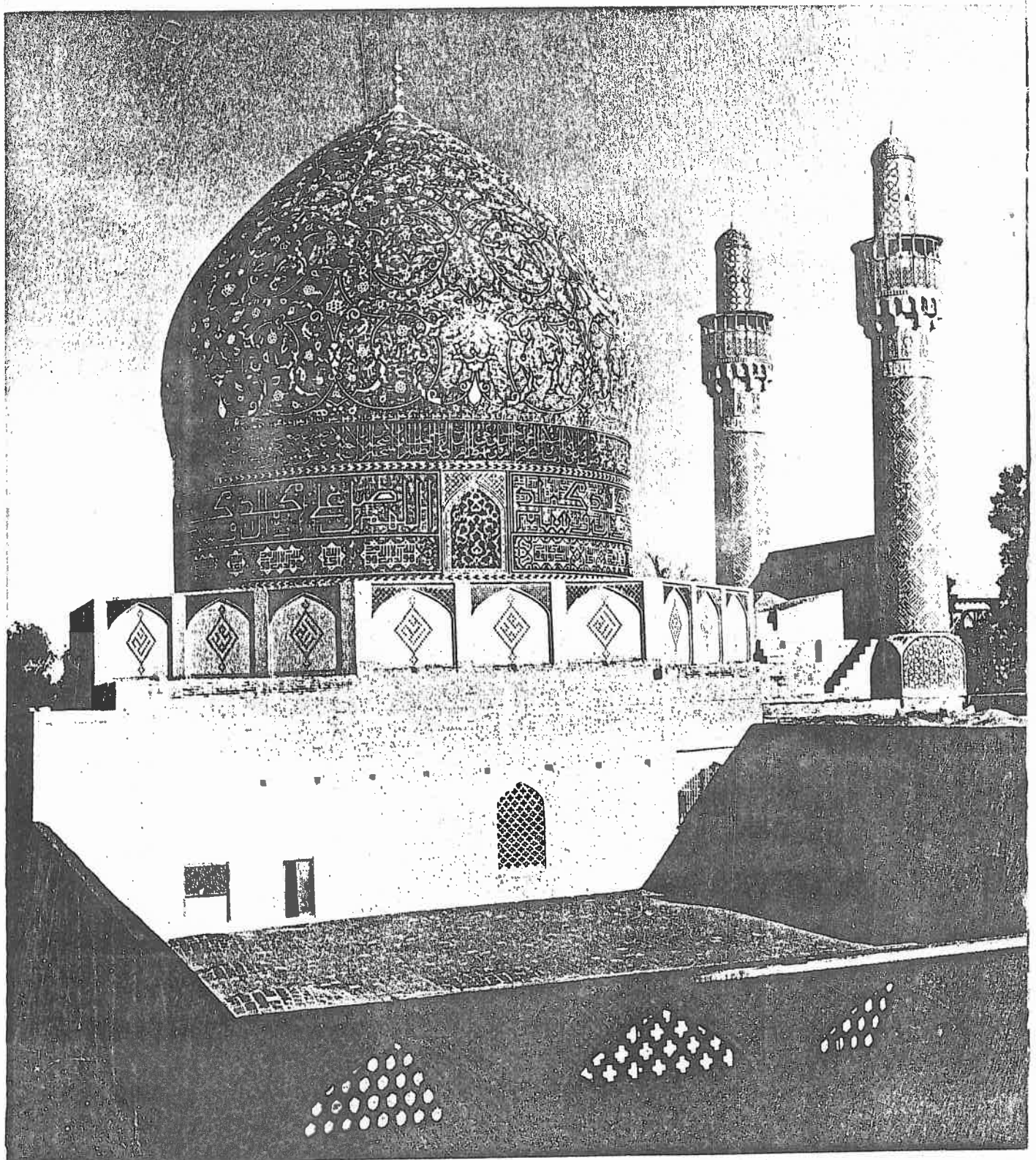


fig 10 Iranian Dome

The observation of the proportions of the body of man microcosm has led to establish a harmony based on numbers in the design of this temple.\*

Figs. 11-  
12

13 We find the same idea carried out in the architecture of the Hindu temple, the Byzantine church, the Gothic cathedral, each with its specific symbols and cannons, but the design concept in all is based on what we may call the sacred geometry.

14 In the design concept of the Hindu temple, the square Mandala of the earth and of the ecliptic, the form of the square is taken as the stage on which is drawn, while it is being acted, the movement of sun and moon and that of the stars in their unequal course, their meeting, reconciliation, and the fresh beginning towards one more coincidence. Such inequality, such imperfection are the cause of existence; the seasons similarly are brought about by the axis of the earth being inclined to the plane of its orbit.

The obliquity of the axis of the earth, the inequality of the motion of sun and moon produce the cycles in which we live. Were it not so and were all coincidence, life would be re-absorbed into the infinite which is beyond manifestation.\*\*

15 Likely mosque architecture has its proper cannons and symbols which were preserved by the 'Sufi' sages who worked closely with the craftsmen-builders, the ones with their revealed knowledge and the others with the skill of their hands. The resultant of this cooperation was handed over from generation to generation by the guild system, developing and evolving within tradition while discriminating between the

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\* Schwaller de Lubicz: Le Temple de l'Homme

\*\* Stella Kraemritch: The Hindu Temple p. 37



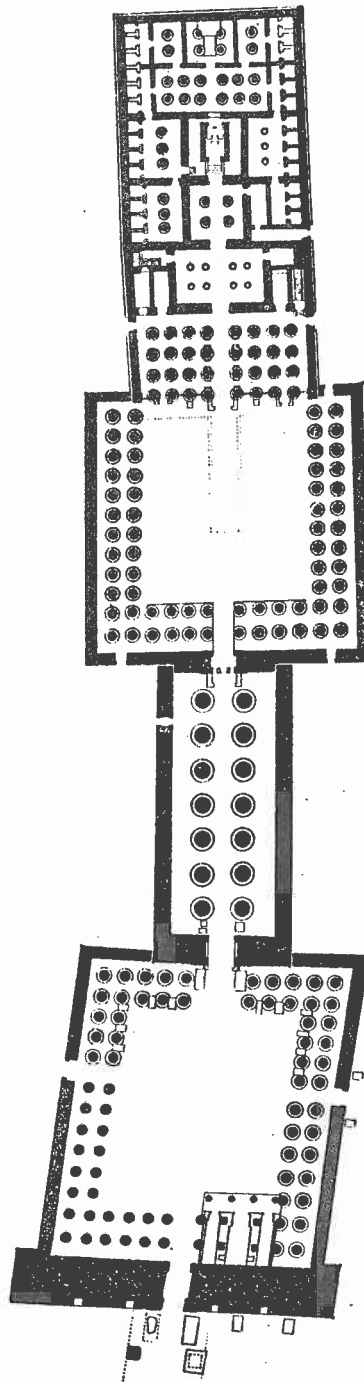


fig 11 - Temple of Luxor

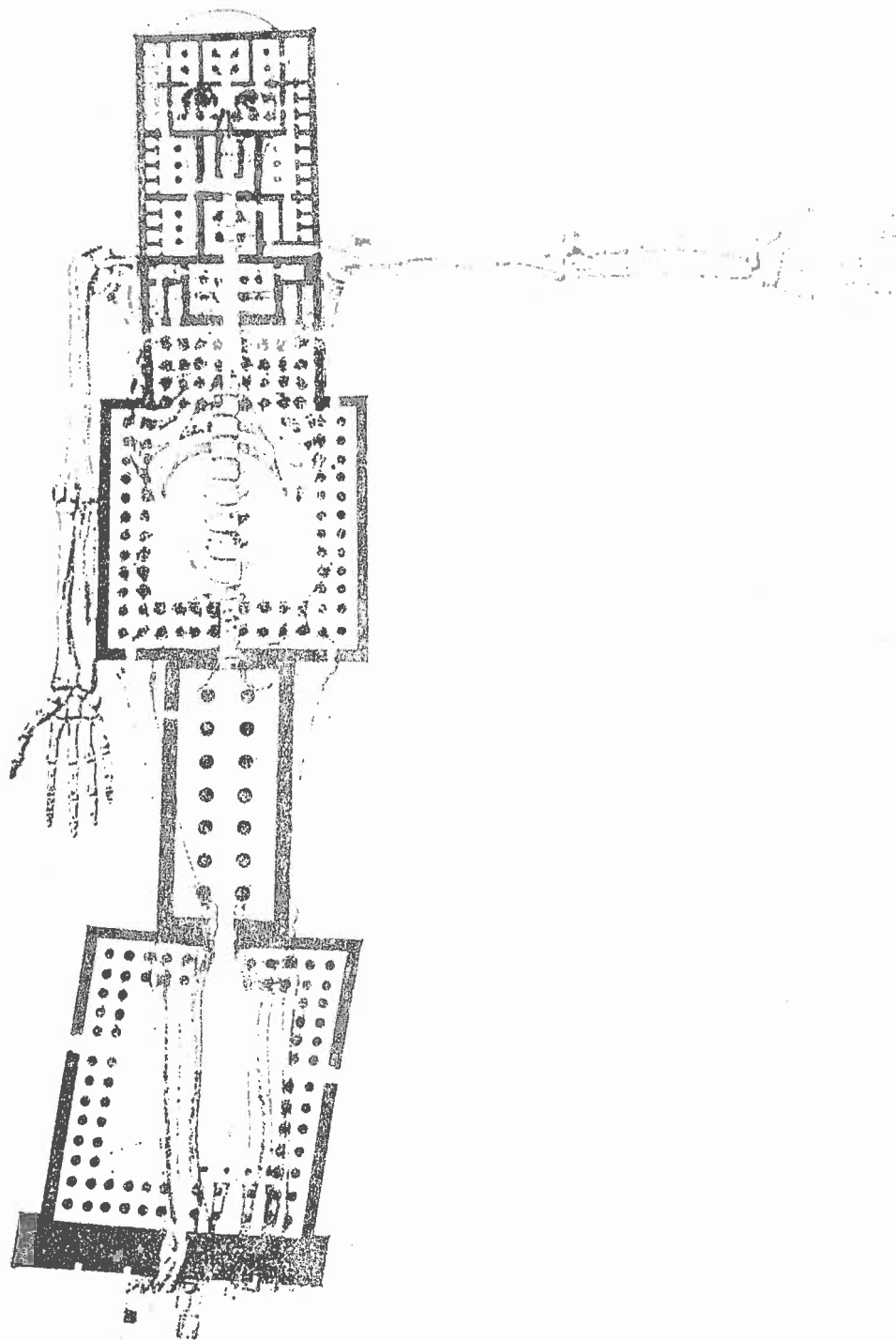


Fig 12 - Man microfilm reader plan

implicit or the constant that has to be respected, or the spontaneous in which the craftsman was free to put in something of his own.

- 16 In this guild system the sage initiated the master craftsman in the secret laws and symbols of the sacred art and geometry, and the master craftsman, in his turn, initiated the apprentice into the secrets of the craft and the handling of the materials.

The master craftsman was the only person entitled to warrant that the apprentice had reached the degree of master vis-a-vis the community. This was announced to the community by a ritual procession in which the graduate was taken round the town on a donkey, dressed in a Kashmir shawl, announcing that he had attained the degree of master.

- 17 By this procedure and by this 'way' permanence and similarity of forms (the symbol) were ensured in the one country and in all Muslim countries. This similarity comes from the oneness of the faith and culture which leads to the choice of similar symbolic forms to denote the same meaning like the hieroglyph or the word which denotes the same meaning to all Muslims.

- 18 A survey of the old traditional mosques in all Muslim countries from Iran in the East to Morocco in the West, would show the recurrence of certain design concepts, architectural elements and decorative motifs that bear great resemblance to one another.

According to the mathematical laws of probability, this recurrence could never have occurred unless there were canons and rules that were consciously applied.

- 19 Nowadays the procedure and methods of design and the methods of design and building have changed from

Sufi master craftsman to the architect-contractor system in which the design and the execution of the work are split, and the cannons of the sacred art are lost.

The revealed knowledge of the sage is now replaced by the modern analytical sciences, while the skill of the craftsman's hand has been replaced by the machine. The result is that we see today so many mosques in almost all Arab countries in which the arbitrary outweighs the implicit and holiness is lacking entirely, and we hope to bring out in this text some flagrant cases of error in mosque design committed by modern architects.

- 20 On the other hand, the revealed knowledge is not given to everybody or anybody, it cannot be acquired by academic learning alone. Just as in art, not everybody can become a Bach or a Rembrandt, so not everybody can become an architect, with the difference that in music and painting, the community is not exposed to the dangers of deculturalization by listening to bad music or seeing bad paintings, whereas in architecture every citizen is forced to behold the dissonances of every bad composer.

- 21 The situation becomes much more critical when we are dealing with religious architecture. Basically, architecture is a communal art and when we come to sacred architecture it will be doubly communal.

If the lack of the cannons of architecture could be tolerated in a commercial building, it would be considered blasphemy in any religious building.

- 22 The new techniques of construction and the new building materials such as reinforced concrete, steel, and plastic etc., have freed the architect from the constraints that traditional materials such as granite, marble, stone, wood and brick imposed on him in the past.

This freedom has offered the modern architect great facilities and possibilities that are difficult to resist, but it cut him off from the benefits of the accumulated experience of the generations that have crystalized into traditions.

- 23 Here, the modern architect has to exercise his creative genius and his artistic sensitivity in creating new forms that suit the new materials without losing touch with the established tradition, preserving the implicit and not overlooking the same spiritual and social virtues nor the cultural values as in the past.
- 24 Antiquating the traditional standards of reference without creating comprehensive substitutes would mean launching man back into chaos.
- 25 In the absence of the sage and the canons of sacred architecture nowadays, the modern architect has to examine the traditional mosques to sort out the features that are common amongst them that could not have come by hazard, showing a conscious awareness and intention, and try to re-discover the canons that commanded them, and respect them in his new design. If he cannot do that, let him at least respect what is constant in form and design concept and not change it.
- 26 • The soul of tradition corresponds to the communion • of man with the natural forms and phenomena incarnating the eternal wisdom. It is the intimate life of artistic forms of an epoch, and its most subtle substance.

The architect has to remember that wisdom does not belong to a unique epoch, it belongs to all times. It is present today as it was yesterday, and can be realized by anyone who desires it and who deserves it.

### The Mosque in the town plan

- 27 In Islam, prayers can be performed in any clean and pure place on the surface of the earth. At the beginning of Islam the mosque was simply an enclosure open to the sky with a covered part for the prayers.

With the increase of sedentariness of the bedouin and the creation of new Islamic cities, or the spread of Islam into previously urbanized communities which had their own developed civic architectures, such as Iran and Mesopotamia, it was necessary to create an urban Muslim architecture. This architecture includes mosques, madrassas, khankas and mausolea.

- 28 At the beginning, the mosque was originally built by the caliph to hold all the worshippers of his capital for the Friday prayers, from where the name "masjid djameh" came, that is, the mosque for all, like the mosque of Amrou in Fostat, Ibn Touloun in Katayea and the Azhar in Fatimid Cairo.

The mosque was located at the crossroads in the centre, near the caliph's palace and the market, so the merchants did not go too far away from their shops when they went for their prayers.

- 29 When the cities grew beyond the limits that permitted the continuation of this tradition, it was found necessary to build subsidiary mosques in the various quarters of the one city.

At times, very small mosques called "zawya", that is, corner mosque, had to be built near the local shopping centre, or for the commodity of the inhabitants in a neighbourhood where the climate is severe like in Pakistan where worshippers should not walk for more than 15 minutes.

- 30 From the town-planning point of view, the mosque has to be in a central position in the neighbourhood it is supposed to serve. The size of this neighbourhood can be estimated by the range of reach of the "moazzin's" voice calling for prayers from the top of the minaret, and the capacity of the mosque can be estimated by the number of adult people who go to the mosque in this area.
- 31 In the traditional Muslim city where density did not exceed 100 persons per acre and the houses were low with the minarets shooting up above them, the size of the mosque in the quarter was found to coincide with the other civic services. Nowadays, this harmony is disturbed by the high-rise buildings which effect the reach of the moazzin's voice and the number of worshippers he can call for prayers in his mosque. Also, the use of microphones has helped in increasing the ecological imbalance in this respect, which will be discussed later under the topic of the minaret.

#### Space in the Mosque

- 32 Architecture is defined as the space enclosed between the walls and not the walls themselves. Architectural space has expressive qualities like sculpture, according to its configuration and size, both absolute and relative.
- 33 Assemblages of space, internal or external, can be dynamic; converging or diverging, multi-directional or uni-directional, rhythmic or arrhythmic etc., just as they can be static, according to the form and the arrangement of the units in succession, with reference to the beholder from one vantage point or as he moves about.

- 33 For example, in the Pharaonic temple, space is convergent. Movement within is axial and space is uni-directional from Pylon to the Sanctuary or holy of holies.

Convergence towards the holy of holies is expressed architecturally by the narrowing of spaces, lowering of ceilings and raising of the floors at strategic points as one moves on till he reaches the sanctuary which works as the focal point in the whole building symbolizing the sun at the horizon.

Only Pharaoh and the High Priest were allowed in, while the masses joining the procession would be stopped at successive points, allowing in less and less people according to their rank.

- 34 In the Christian church, worshippers entering from the portal would proceed axially in a longitudinal architectural setting with nave and aisles leading to the altar at the end.

The worshippers in some churches are hierarchized by degrees of holy status; the newly converted at the back near the entrance, then the normal Christians and at the end, the deacons by the altar.

- 35 In the mosque, the worshippers proceed from entrance to "megaz" or offset with non axial corridors which take up the divergence between the alignment of the street and the direction of Mecca, which rarely ever coincide. These passages are usually very simple and denuded of decoration working as a preparation for the event of reaching the magnificent and colourful "sahn" or courtyard, and having a glimpse of the climax in the composition.

- 36 These qualities of space are as strongly felt as those one experiences in visiting temples, cathedrals



and mosques, each with its character expressing its people's faith and conforming to their particular rituals. Therefore, great care has to be given in handling this felt, man-made space in the design of any sacred building. If the space is not in keeping with the religious traditions in the design, then no decoration can naturalize the building in the religion.

- 37 This is not say that decorative elements are not important; all that goes into the design like the decoration, texture, materials, form, etc., has a symbolic value in tradition.

Tradition embraces architecture in its totality with all the elements that together make the religious building; design-concept, space, shape, decorative motifs, colour, light and even acoustics in the building.

- 38 Space in the mosque has to be two-directional; the one vertical tending upwards linking it with the sky, and the other horizontal linking it with Mecca. The horizontal direction is due to the fact that Islam is ecumenic - which idea is expressed by having one sanctuary for all Muslims, the Caaba in Mecca. This direction is indicated by the "qibla" or niche, but this is not sufficient, and it has to be expressed by the building itself tending architecturally towards Mecca.

- 39 It would be an achievement indeed to express movement architecturally in a building where the structure is of a rigid nature, but this has been achieved in traditional sacred architecture. Energy here is associated with asymmetrical configuration, and movement is manifested by shifting a centre of gravity or a focal point in the visible space from where it is normally expected to be, towards the direction we want to point to.

- 40 In the covered prayers area in the mosque, the upward movement is expressed by the dome symbolizing the sky:

and the horizontal movement is expressed by shifting this dome from its expected position in the centre of this prayers area, towards the qibla and accollating it to its wall, as for example, in the mosque of Ibn Touloun in Cairo, where the prayers iwans are covered by flat wooden roofs except for the bay in front of the qibla which is covered by a Sassanid dome.

Figs. 13-  
14

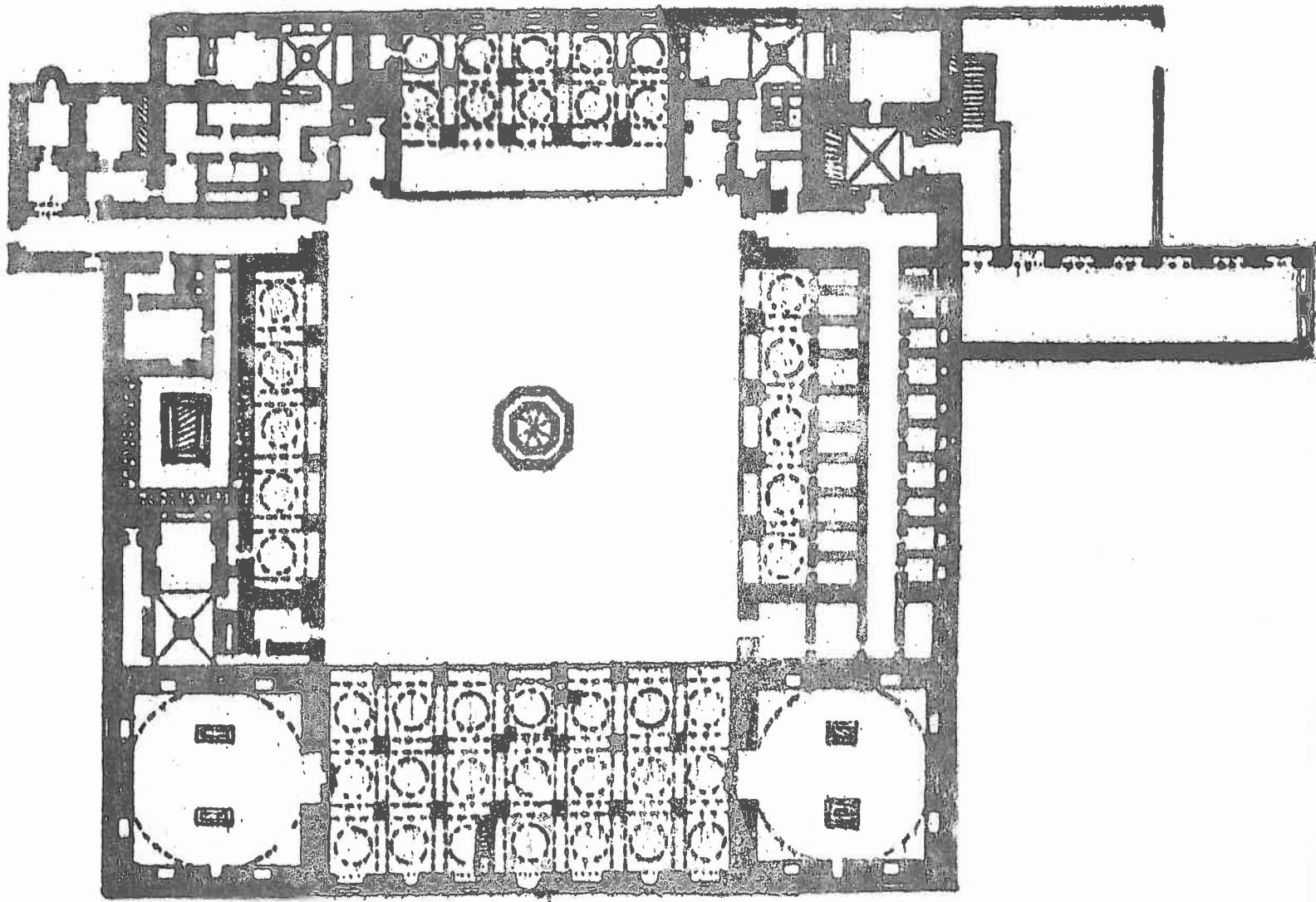
- 41 There is an interesting case which deserves mention in the mosque of Barquq. The prayers iwans of this mosque are all covered by Byzantine domes on pendentives except for the bay in front of the qibla which is differentiated by having a dome on squinches, for its symbolic value, expressing contact with the sky or vertical movement.

Fig. 14

#### The Arch in Mosque Architecture

- 42 Each arch with its curvature has its symbolic inner meaning and specific expressive character like all geometrical forms.
- 43 In Islamic architecture, the semi-circular arch is avoided in general, and only the pointed, segmental or horse-shoe shaped arches are used. This is due to man sensing the lines of force in the structure and giving form symbolic meaning.
- 44 In the semi-circular one the weight carried by the arch is transmitted to the voussoirs in which the reaction is normal to the surface of joint. This reaction is carried on through all the voussoirs making the total arch, until it comes to the springing where all the forces running along the curved structure are counteracted by the vertical reaction of the springing stone, and we have a symmetrical stability. Symmetry is associated with death, and the semi-circular vault or arch in Pharaonic culture is described as Osirian, the god of the Dead, coming up from below and returning back down to earth.
- 45 In the pointed arch, the lines of force meet at the top at an angle with reaction lines at the keystone running out of the structure tangentially to the two

Fig. 15a



→ domed on the right

FIG. 27.

Sultan Barqad Mosque

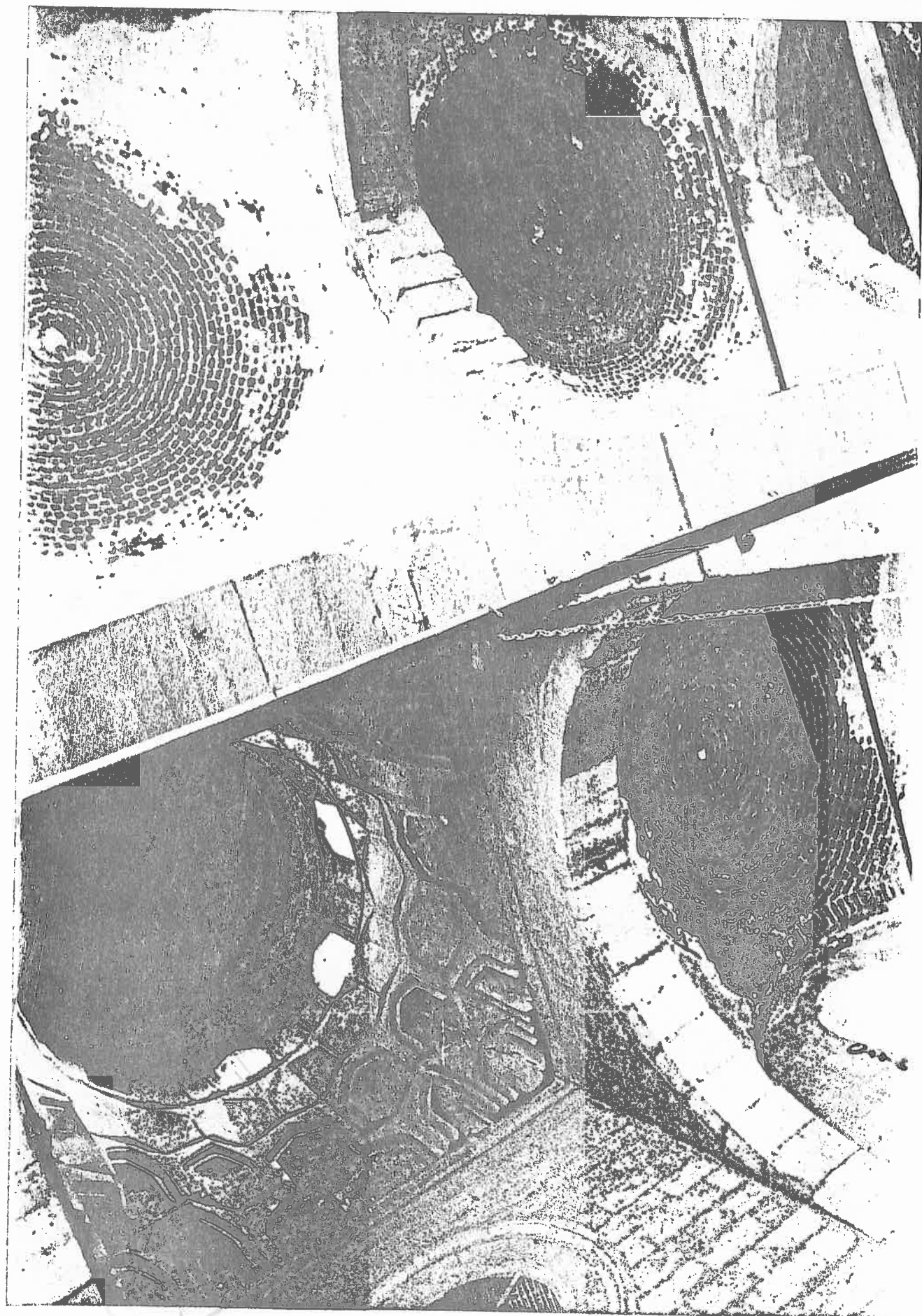


FIG. 272 Mausoleum of Sultan Barau  
Dome on squinches above

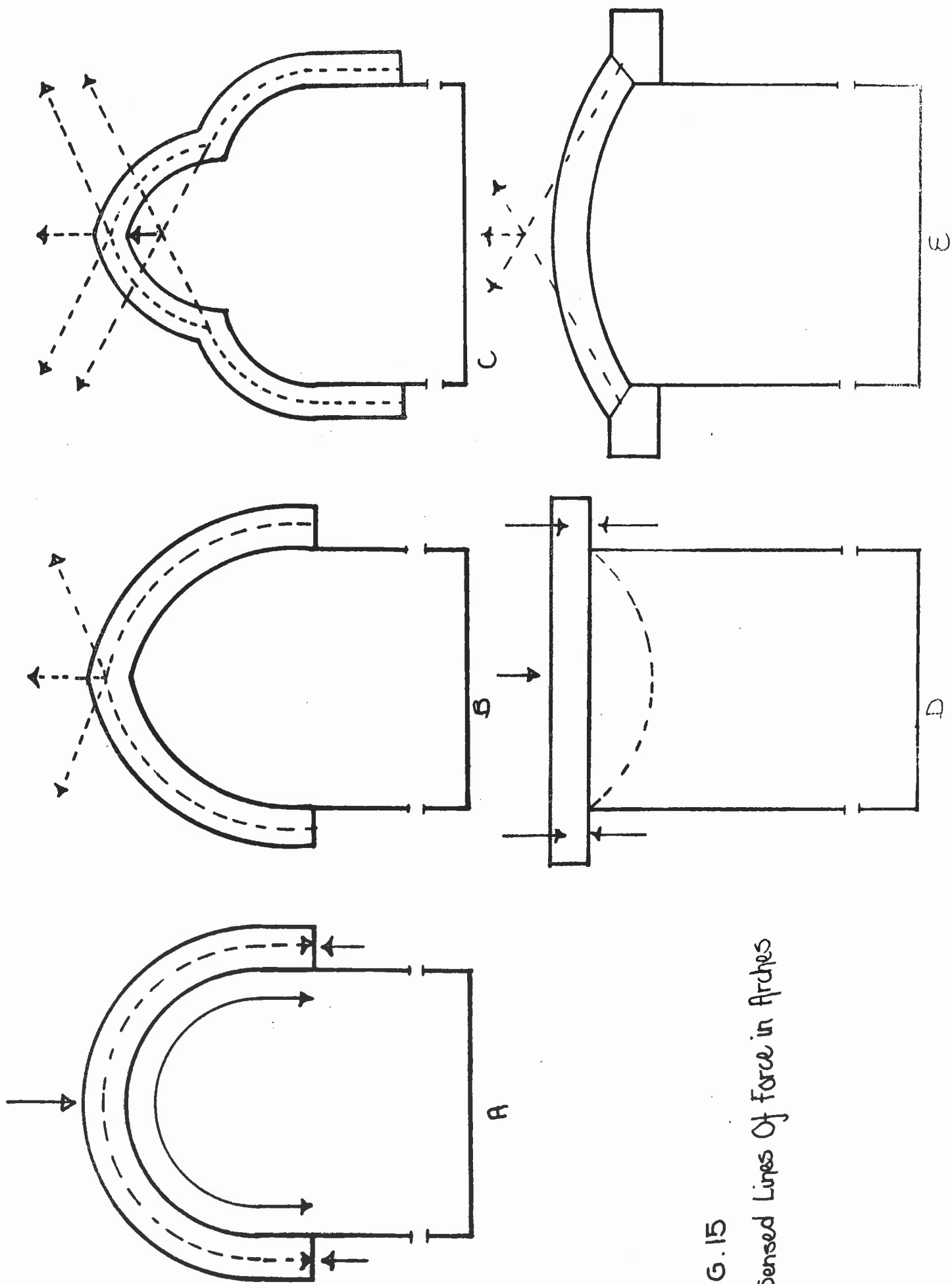


FIG. 15  
Sensed Lines Of Force in Arches

curves meeting at the top. These two tangential lines of force would suggest a vertical resultant, and man sensing these lines of force and their resultant would associate this form of the pointed arch with man rising up.

Fig. 15b

### The Doorway

- 46 In general, the door has a symbolic meaning, demarcating the passage between interior and exterior, and more so, in the case of a religious building where it marks the passage from the unholy to the holy.

In mosque architecture, the doorway resumes the architecture of the facade giving its focal point by its loftiness worthy of the entrance to the house of God.

- 47 In all traditional mosques there is one single door symbolizing the oneness of God and in between his hands the worshipper is going to pray. We find the same idea and the same symbol prevailing in all religious buildings, be it a cathedral, a Hindu temple or a Pharaonic one.
- 48 Among the Pharaonic temples there is one which at first sight may seem to be an exception, having two doorways; this is the temple of Kom Ombo. In fact, however, this is a twin temple or two temples accolated to one another; the one for Horus the hawk and the other for Sebek, the crocodile, each with its doorway and its own passages leading to its sanctuary for its proper Neter. To have more than one door would contradict the idea of oneness, spoiling the character of the mosque and making of the building a railway station or a theatre.

In the case of the mosque-madrassa with four schools for the four sects, it has only one door, the four sects worshipping one God.

- 49 To be inviting with discretion the doorway is made recessing from the facade not protruding out into

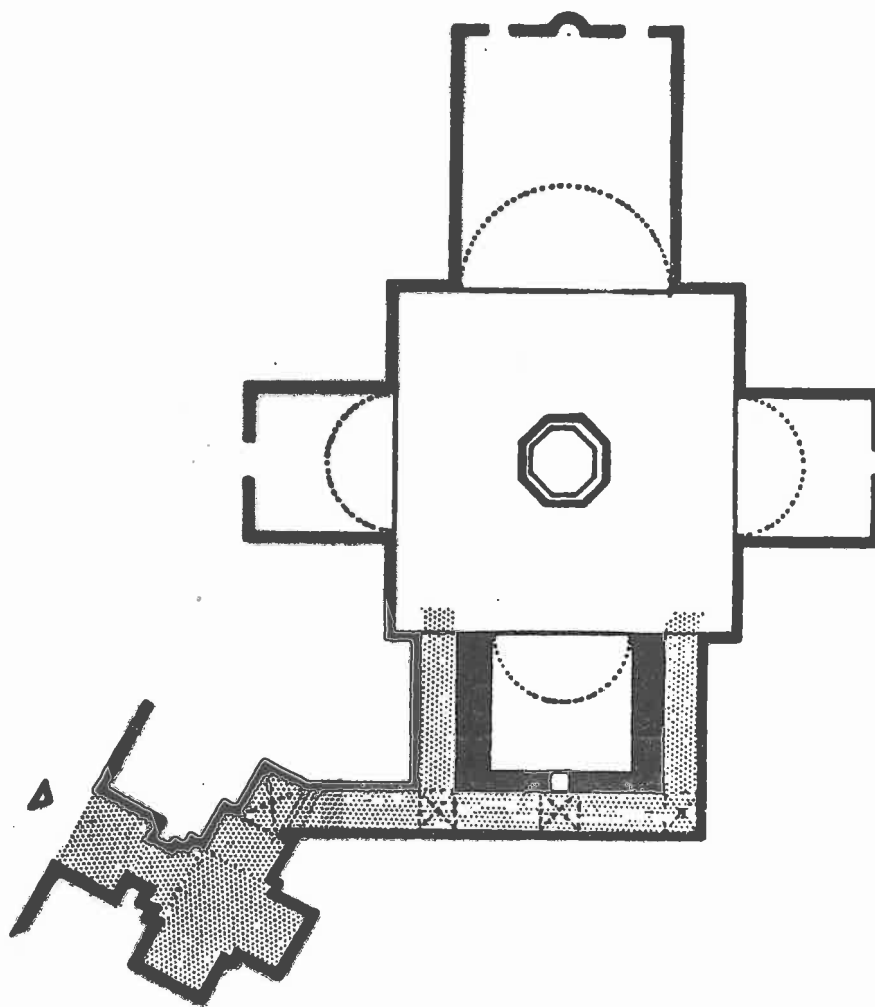


FIG 16 a

the profanity of the street.

Fig. 16

By its architecture, the doorway should express aspirations towards the divine by loftiness and verticality. This is expressed by the composition going up to the full height of the facade, with the lines of the recessed area leading up to a similar semi-dome or a vault with the curvature of a pointed arch covering this recess, thus continuing ascension beyond the building top into the sky.

Fig. 17

- 50 If the door had a flat lintel, then the ascending eyesight would have stopped there.

Fig. 15d

If it had a semi-circular vault this would be worse still, because then, the ascending lines would have returned back down to earth, instead of just stopping up there at the flat lintel.

- 51 In the highly developed mosque architecture of the Mameluk period in Egypt, the inner surface of the recessed entrance is brought out to the surface of the facade at the top by means of squinches with stalactites.

Fig. 18

After the eyesight had brushed the surface of this semi-dome, it is lifted still higher by a slightly recessed niche on top of the pointed arch.

Fig. 18a

- 52 Some modern architects, for innovation, have overlooked the tradition and designed mosques with porches for the entrance that are protruding into the unholy space of the street, extending horizontally with several doors. This unholy concept makes the entrance lose its loftiness, expressing the horizontality of the masses in the profane street before they have joined the saff in prayers between the hands of God, and the several doors would be discordant with the idea of oneness.



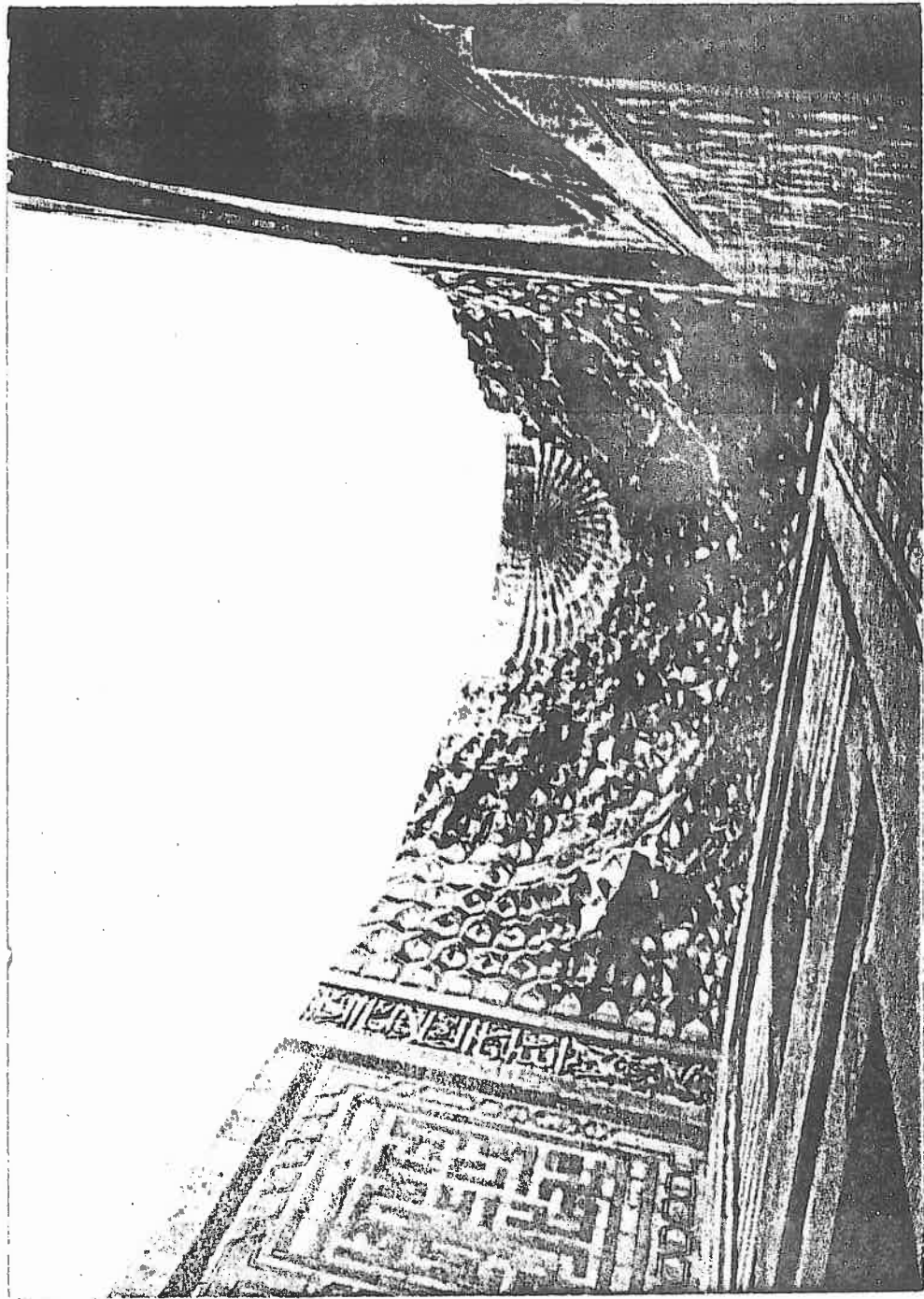


FIG. 16 Entrance of Sultan Hassan

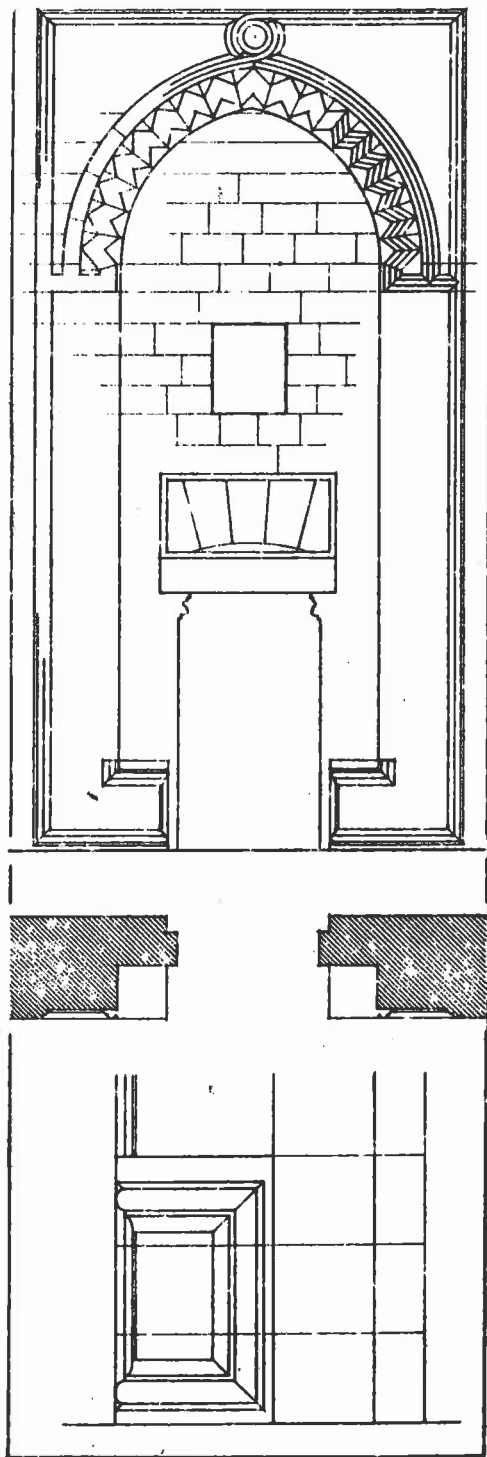


FIG. 17 a. Entrance with  
pointe arch.

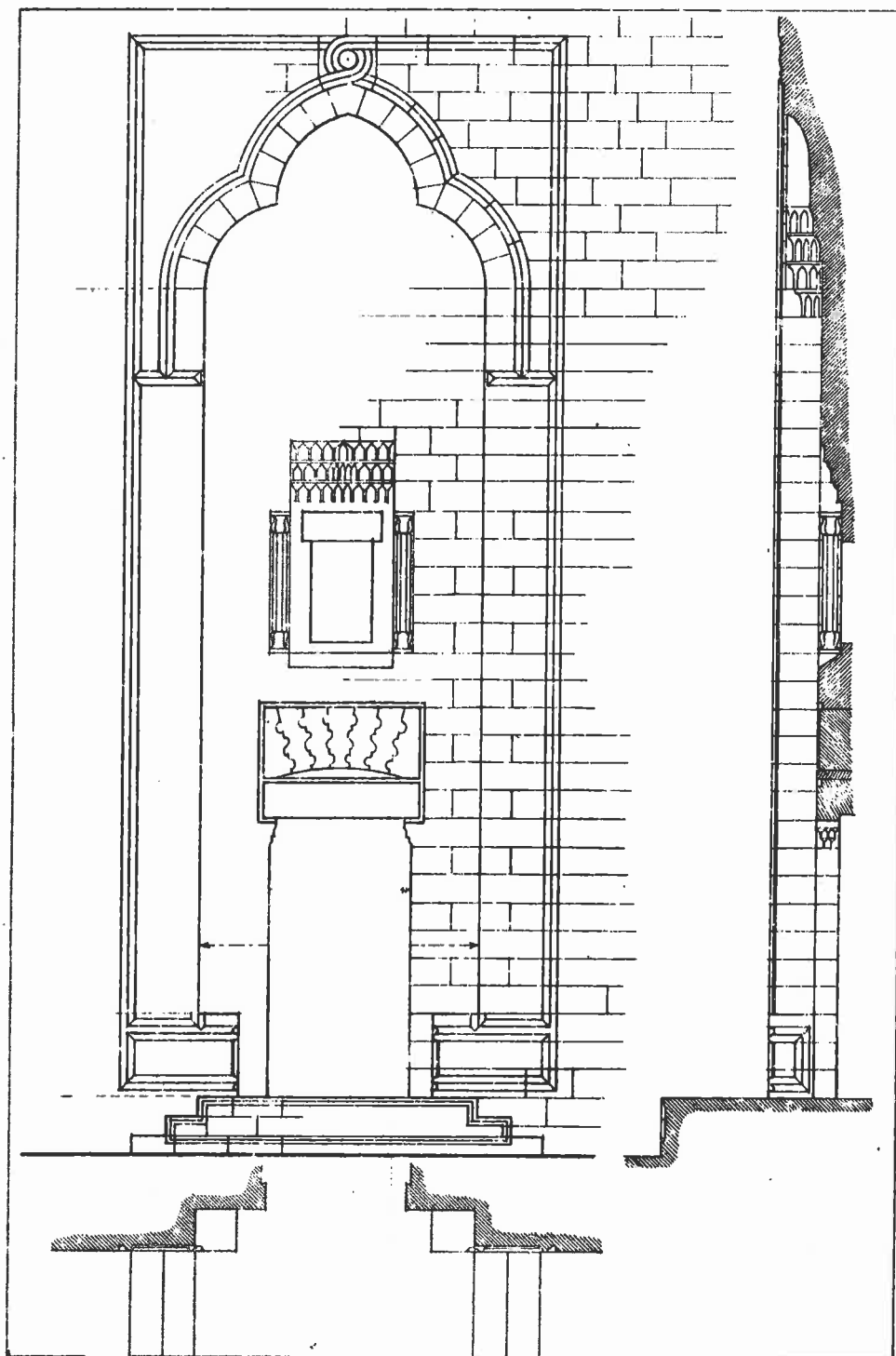


FIG. 17. b

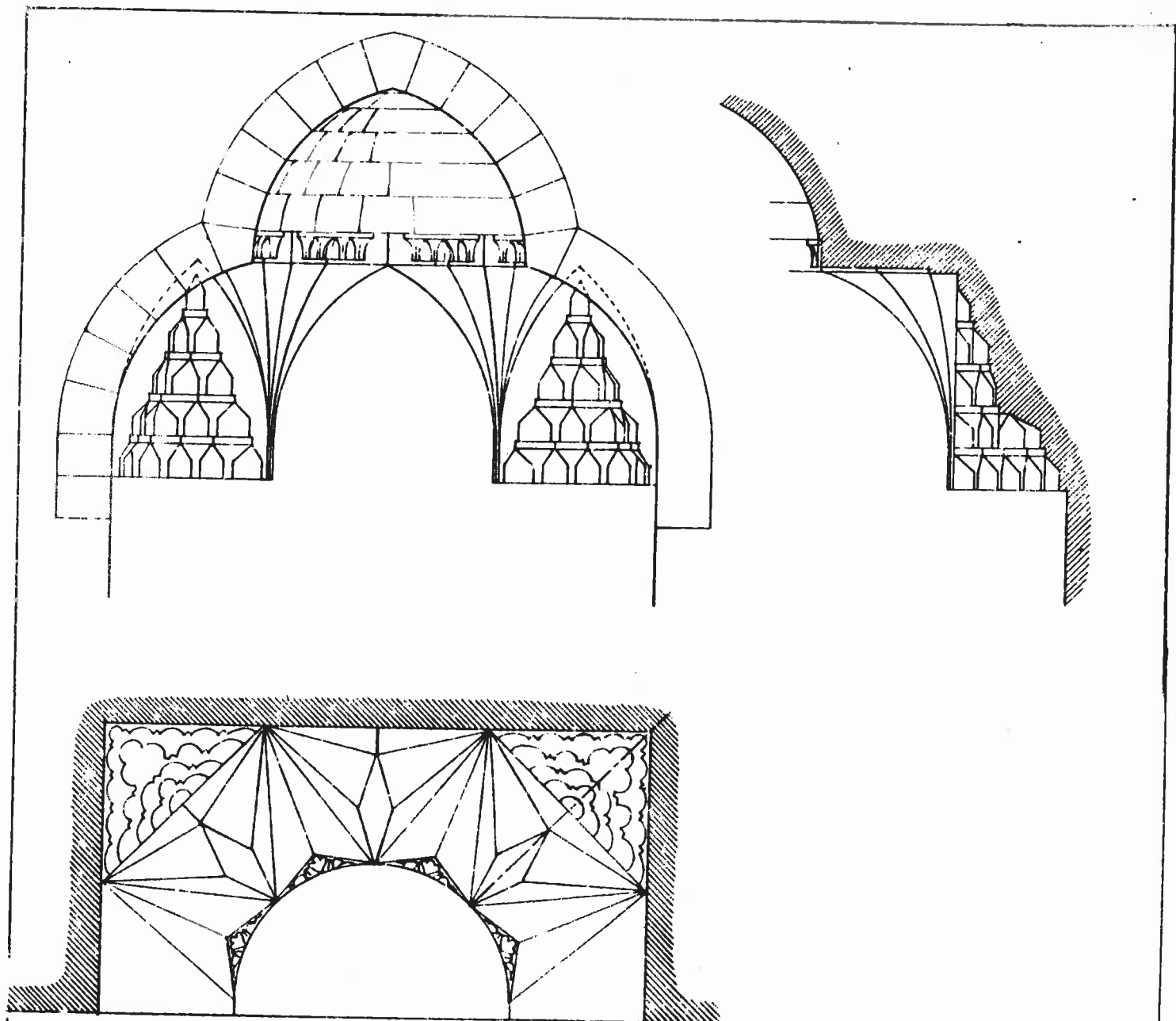


FIG. 18 a.

Entrance with squinches

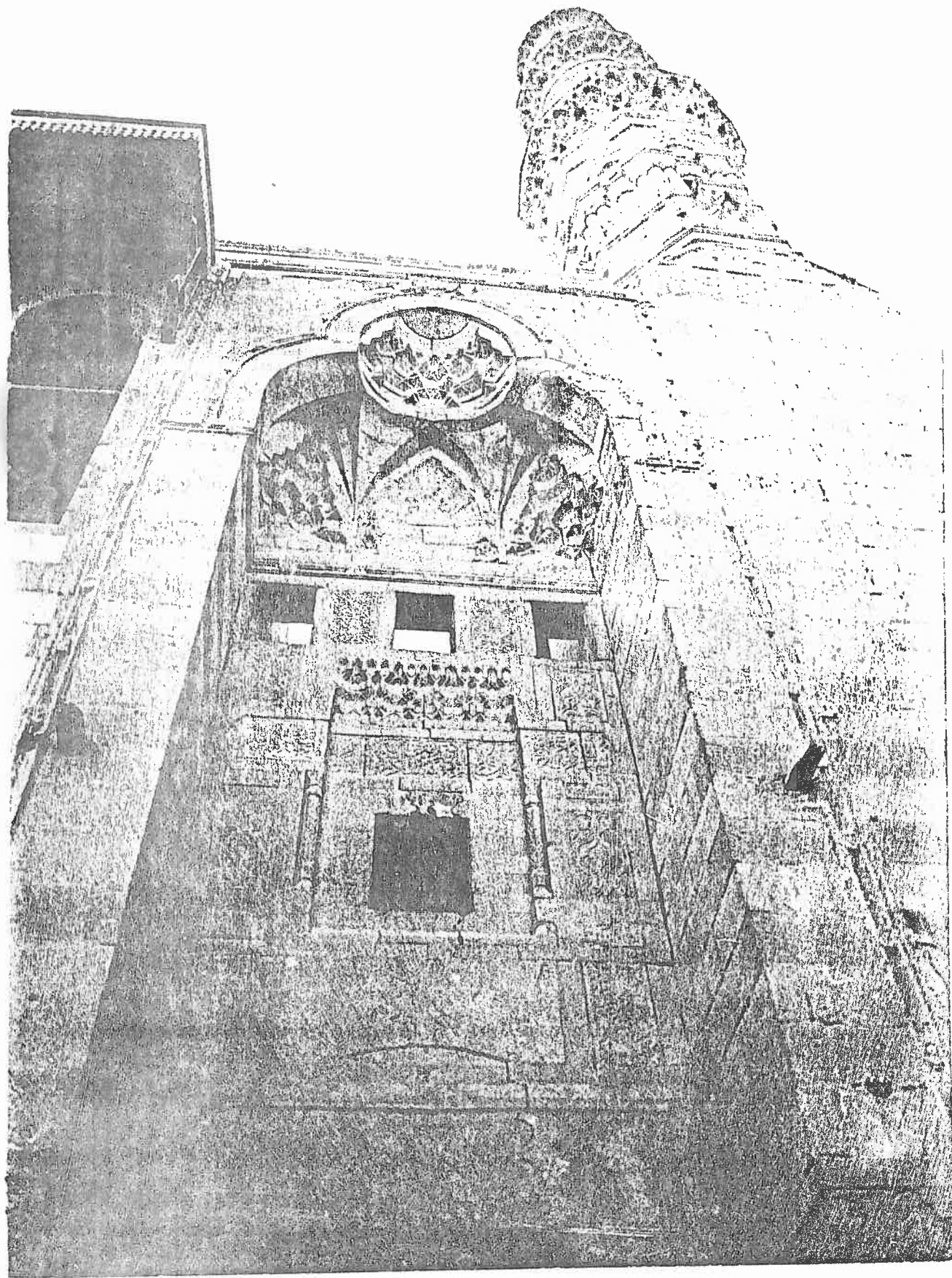


FIG. 18 Palace with squinches

### The Entrance Hall and the Magaz

- 53 The entrance is the first element of the plan receiving the worshipper entering into the mosque.

It has to greet him with all the dignity worthy of the holiness of the house of God. Its interior decoration is always of grand style, having a dome on squinches or an elaborate groin vault for roof.

The entrance facade is to follow the alignment of the street while the prayers area is to be orientated towards Mecca and the two directions rarely coincide creating an architectural problem of great interest. In old mosques, this problem is solved in many clever ways.

The transitional passages between the entrance and the sahn or the prayers hall give a convenient area in the plan to take up the bends and offsets necessary to cope with the discrepancy between the two orientations. At the same time this solution provides for a magaz shutting off the view of the street from the interior in a natural way.

- 54 In this area the ablutionaries and the service quarters can be located, which elements do not need to be regular in form as the entrance and the prayers hall, and the irregularities of the plan are thus taken up comprehensively.

An interesting example is to be found in the mosque of Sultan Hassan where the passage from entrance to courtyard takes place in a magaz with four bends.

Fig. 16

### The Ablutionaries

- 55 The sahn or courtyard and the prayers iwans are sacred and clean areas. No one is allowed in there with his shoes on or without having performed the ablutions.

Normally, these ablutionaries would come in the plan in the transitional area between the entrance and the sahn.

Ablutions comprise washing one's head, arms and feet, which should be performed with ease especially with elderly and fat people. By necessity, they have to be seated, and the setting of elements and the dimensioning of the arrangement for ablutions, like seat, water-tap and drain have to be related to the human body and the movements of the limbs.

To avoid water splashing around or water running down from the tap it should be made to meet the side of the drain at an acute angle, not to fall down perpendicularly to the bottom. To avoid people using it as a urinal it is advised to have the seats facing one another.

Figs. 19-  
20-21

- 56 Arrangement is to be made in the plan allowing for those who have finished with ablutions to reach the prayers hall in clean passages without the need to put on their shoes and to take them off again.

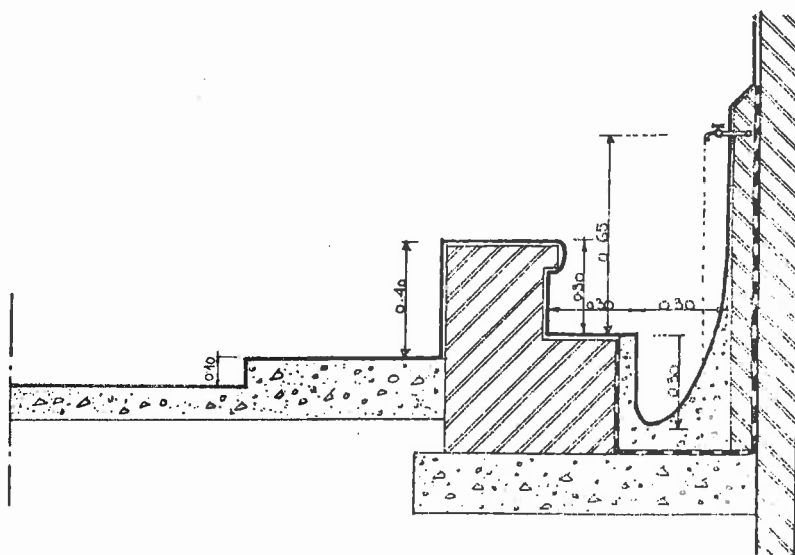
The ablutionary is to comprise W. C.'s and for certain religious ordinances it has to have showers too for the poor who have not got them in their dwellings or strangers to the city.

#### The Scarpiniera

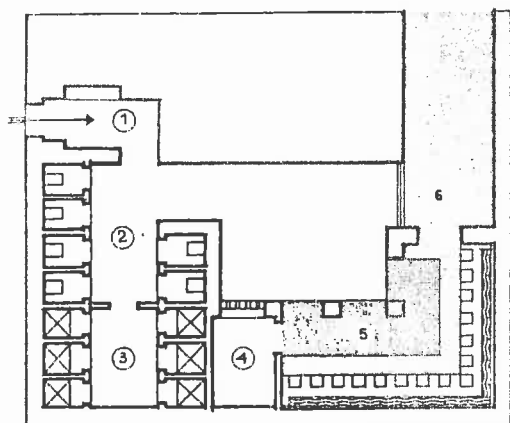
- 57 The mosque has two distinct areas: the clean, comprising the sahn or courtyard and the prayers iwans, and the unclean: the passages leading to the ablutionaries.
- 58 Amongst the rituals in prayers is prostration, bringing up the forehead to the ground. Thus, no one is allowed to step into the clean area with his shoes on.



ABLUTIONARY WITH JEAT FACING ONE ANOTHER  
FIG. 21.



# ABLUTIONARY



1. ENTRANCE 2. WATER CLOSET 3. SHOWER  
4. BOILER RM. 5. ABLUTIONARY 6. CLEAN PASSAGE

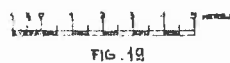
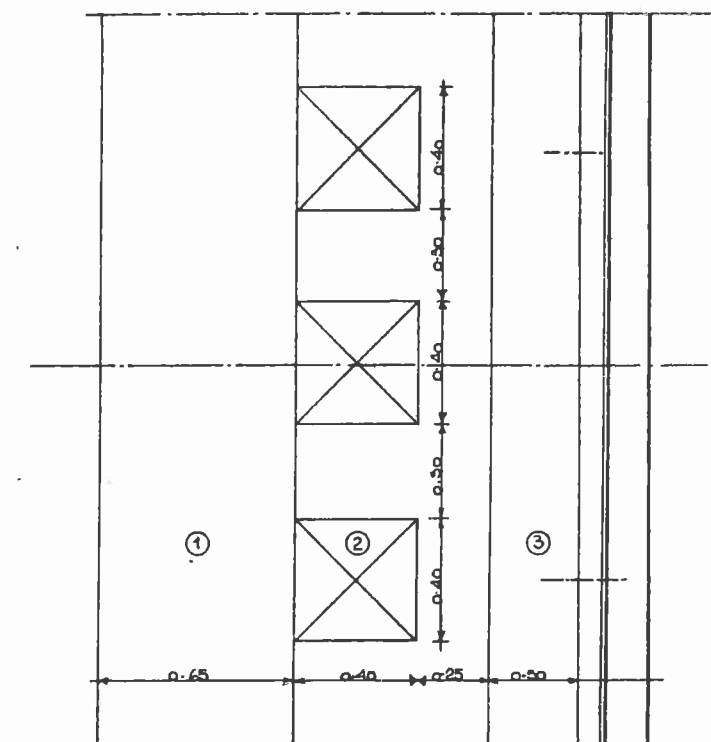


FIG. 19



1. CLEAN PASSAGE 2. ABLUTION/ JEAT 3. GUTTER

FIG. 20



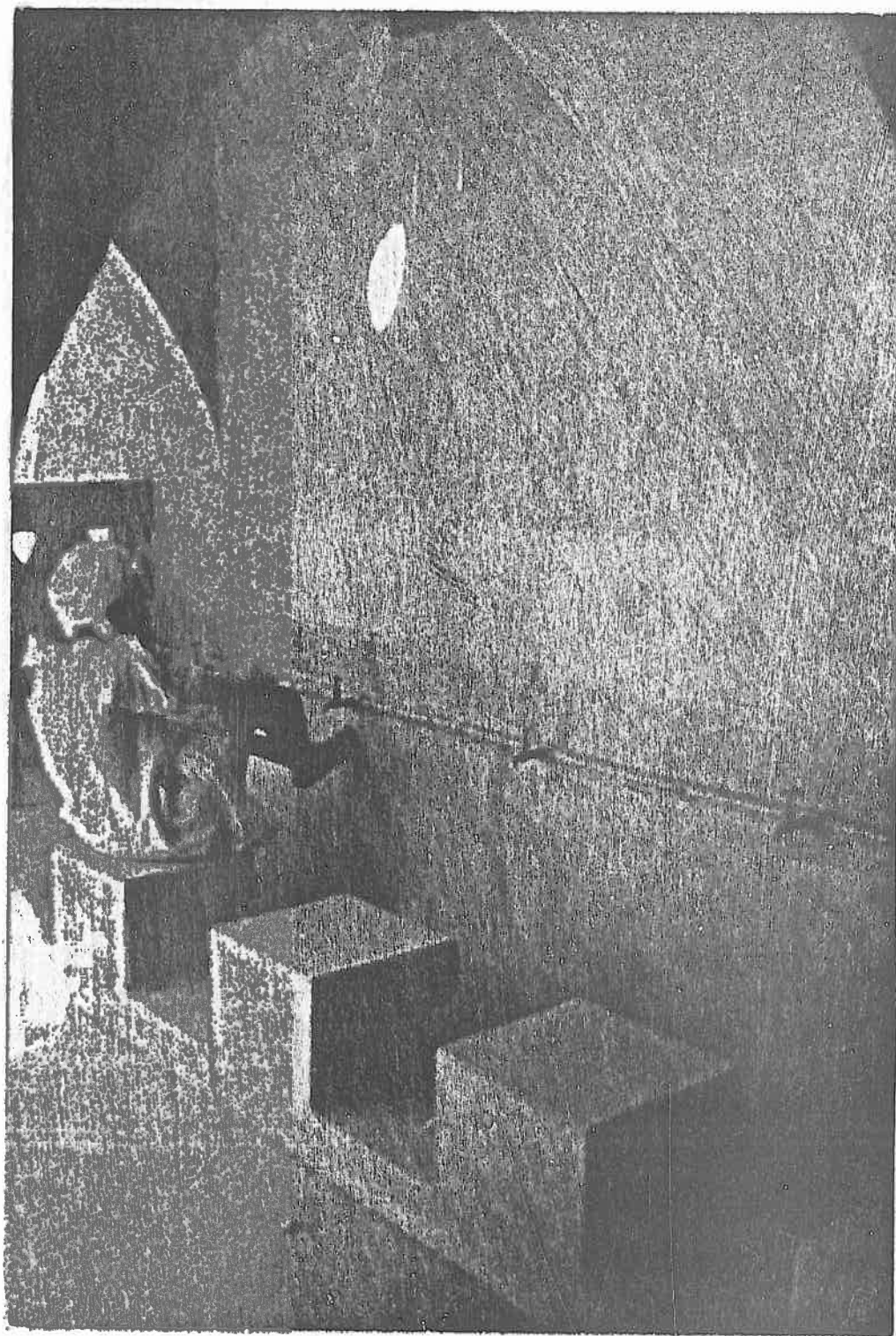


FIG-19.b ablutionary in mosque  
of Gourna village



Apart from that, it is considered a sign of respect to take off one's shoes at the portal before entering the mosque. This creates a problem as the process of taking off and putting on shoes may not be commodious to elderly people or fat people who cannot stand on one foot.

- 59 So it is thought to introduce a new element in the design which may be called 'Scarpiniera' or shoes-room to be situated at the portal in which the worshippers can take off their shoes before entering the mosque while seated. It may contain shoe shelves or these may be placed inside the mosque at a convenient location.
- 60 This scarpiniera has to be directly accessible from the recessed entrance to accommodate the worshippers who had already performed their ablutions. At the same time, it has to be accessible to worshippers who had performed their ablution inside the mosque.
- 61 Worshippers arrive more or less individually at the mosque, but they come out all together after the Friday prayers, therefore, special arrangement should be made to cope with the great numbers. An attempt to give probable solutions in the design is shown in Figs. 22-23

#### The Prayers Hall

- 62 The prayers area is to be preferably rectangular with the large side facing Mecca. This disposition has two main reasons, the one being that worshippers pray in a row or "saff" behind the Imam facing the Qibla, and the nearer the row to the Imam the more meritorious the worshippers in this saff are, so the rows have to be laterally the longest possible.

When the worshipper has joined his saff, he will have been integrated with the others in it and they will all face the Qibla collectively as one body.



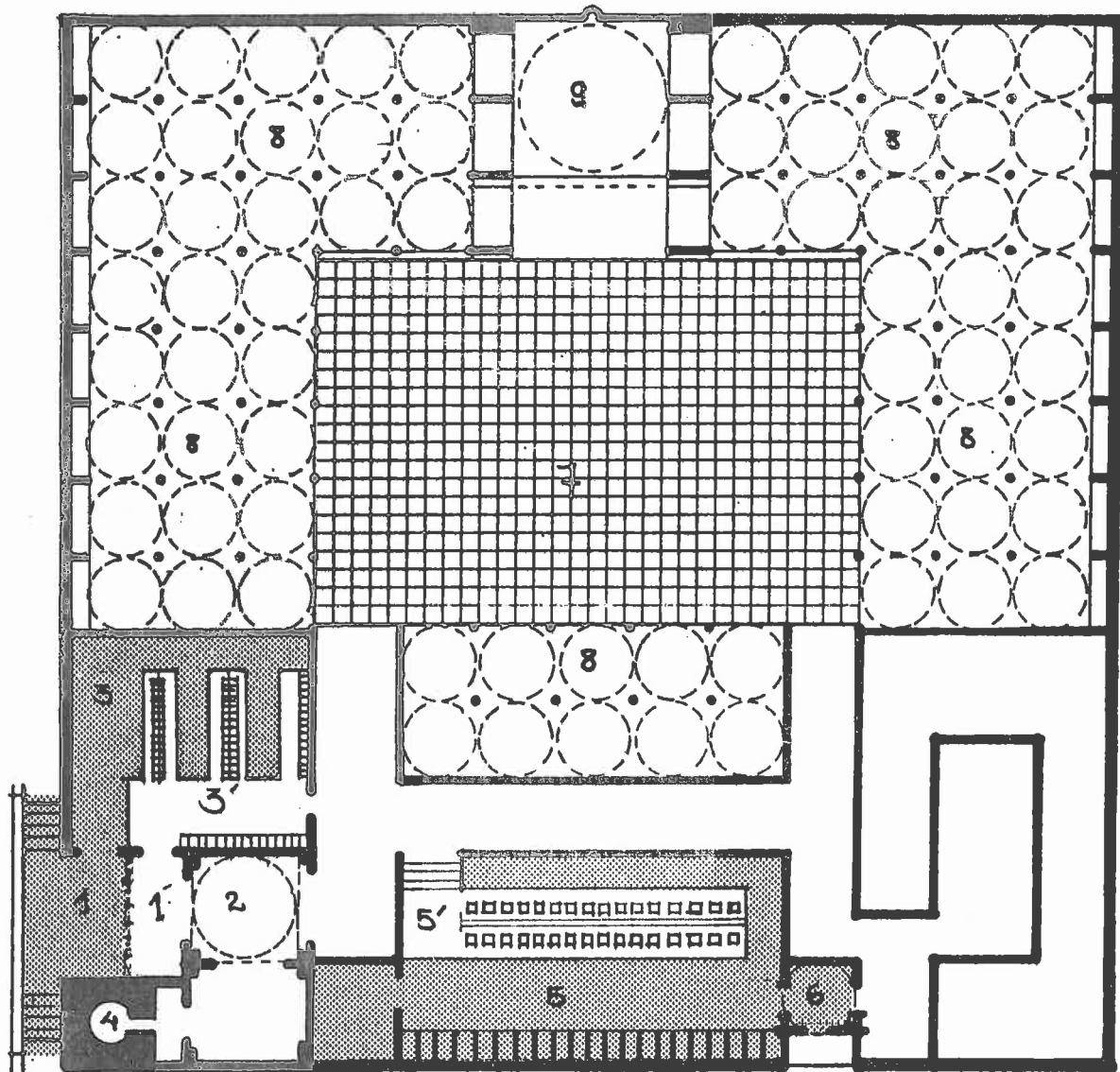


FIG. 23

- 1- Recessed Entrance
- 1'- Clean Part of R. Entrance
- 2- Main Entrance Hall
- 3- Scarpeniera
- 3'- " Clean Part
- 4- Minaret
- 5- Ablutionary Seats facing one another. Unclean Part
- 5'- " Clean part
- 6- Ablutionary Entrance
- 7- Sahn
- 8- Prayers Area
- 9- Dome above Qibla bay.

The second reason is that one has to recognize the direction of Mecca immediately on entering the prayers area by its very layout without even having to look for the Qibla. Here, the laterality of the hall accommodating the saff will give the direction.

- 63 We see nowadays new mosques in some Arab countries in which the prayers area is designed with an octagonal or circular plan. Such plans are discordant with the saff configuration or worshippers in rows. Also, such plans are non-directional, the circle expressing chaos, as the eye goes from one point to the other round the circumference without knowing where it started and where it ended. Such designs are to be strongly condemned.
- 64 It is true, the Dome of the Rock in Jerusalem has an octagonal plan but this is a very special case. The Dome of the Rock is supposed to have been a centre and a sanctuary itself, like the Caaba in Mecca and therefore, a meeting point of all directions, so geographically and architecturally it has to be non-directional otherwise, the centre would be somewhere else outside the sanctuary in the direction where the structure is pointing to.
- 65 Another design concept that should be avoided is where we have a square plan with a central dome in the middle. In the first place, the figure of the square is non-directional. In it the four sides or points are equally expressed by the equal sides of the square. Secondly, by having the dome in a central position, though expressing contact with the sky, it cuts off the internal space from Mecca, and the dome has to be shifted towards the Qibla.
- 66 The prayers area in early mosques comprised two main elements: the sahn or open courtyard and the covered prayers area. The sahn ensured contact with the sky,

Figs. 24-  
25

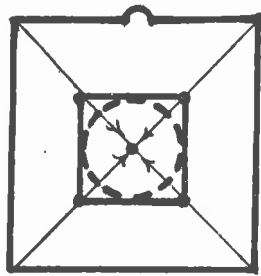


FIG. 24

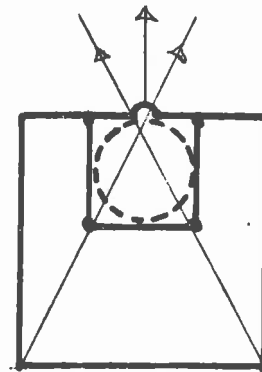


FIG. 25

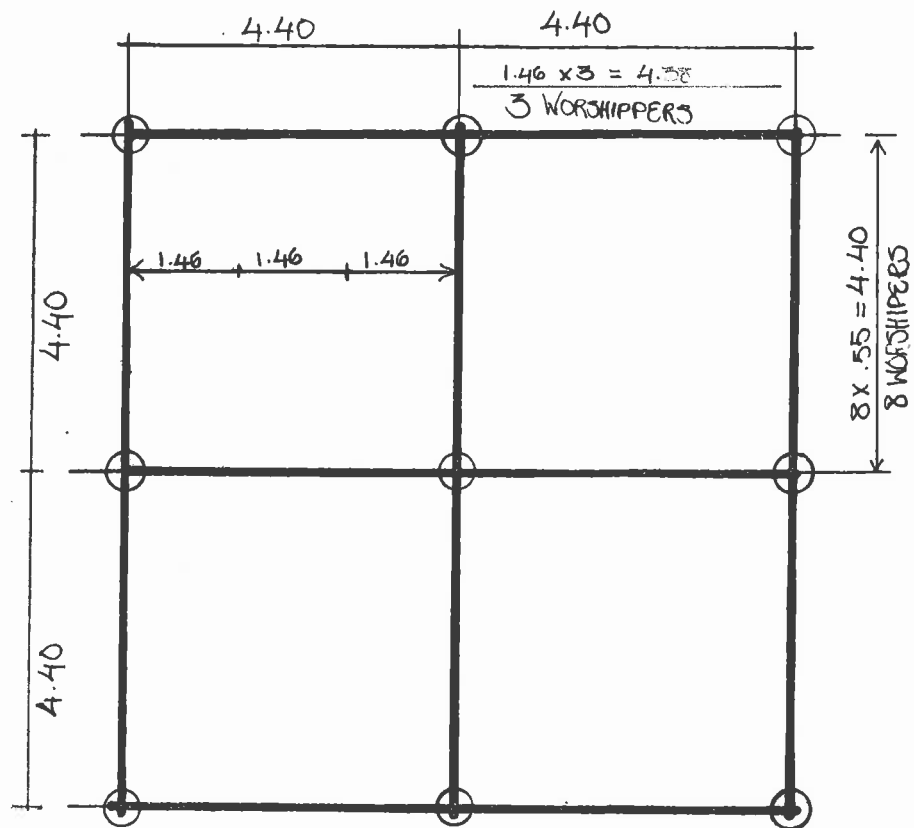


FIG. 41

in Arab cosmology, the four sides of the sahn symbolizing the four columns carrying the celestial dome.

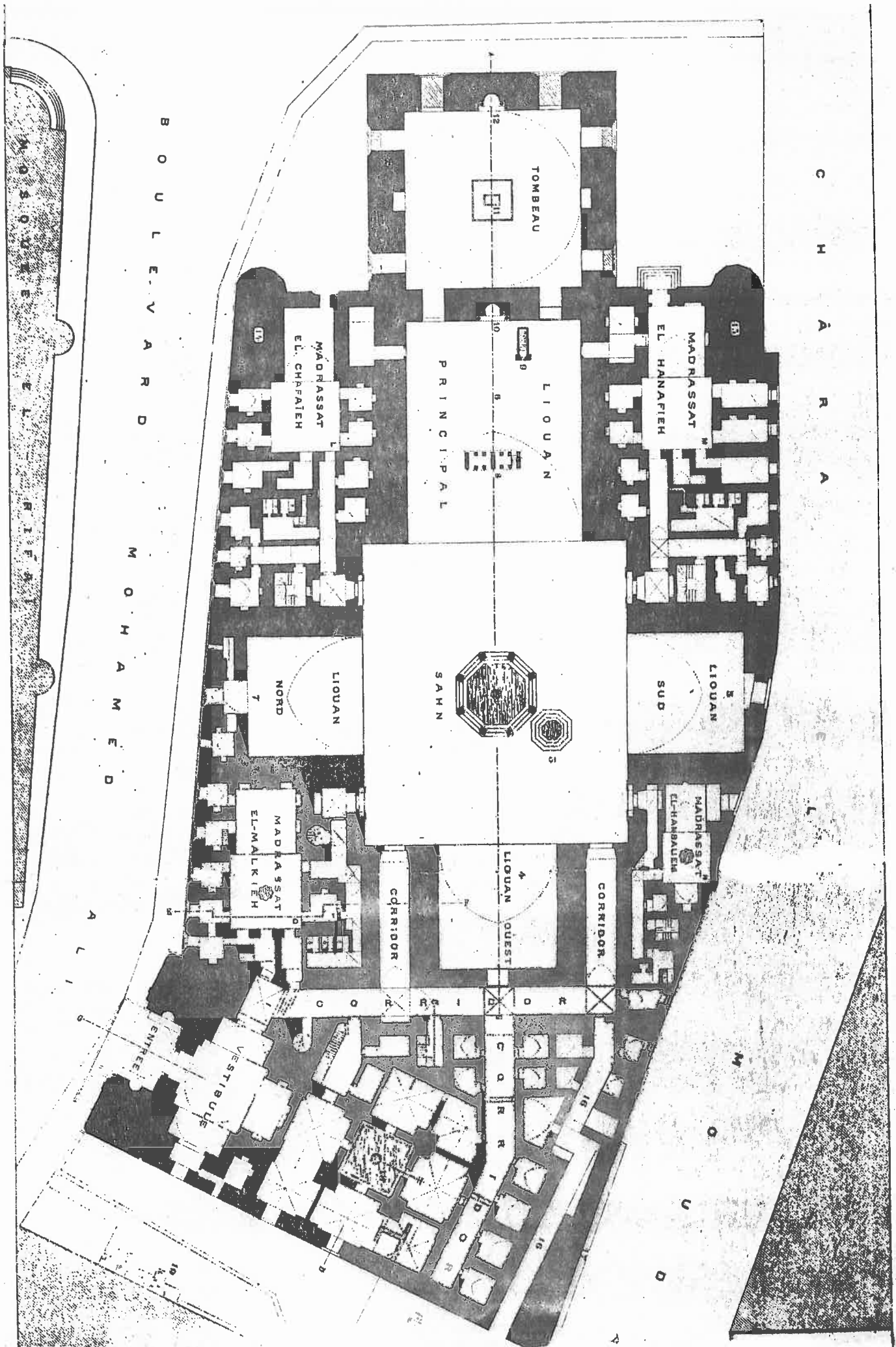
- 67 Light in the covered area came solely from the sahn, that is, from the real sky and from openings in the drum of the dome above the mihrab bay which symbolizes the sky. In this way the light reflected from the shell of the dome is gentle and diffused in the space, not jarring as if it came from low, ordinary windows or from an ordinary lantern with a flat top as seen in some new mosques.
- 68 Prayers can be performed in the sahn when the covered area is full of worshippers, if the weather permits it. Therefore, the two elements are considered clean and people have to take off their shoes before entering.
- 69 Apart from the Friday sermons, the covered area is used for religious circles with masters debating and teaching theology and other sciences.

In Islam there are four sects: Hanafi, Shafi'i, Maliki and Hanbali. At the beginning, the learning in the mosque-madrassa or mosque-school was limited to one sect, that of the caliph or notable who built it. Later, learning in the mosque-madrassa comprised two sects with the name "madrassa thunal'ya" meaning double school. This was followed by triple and quadruple schools for all the four sects.

- 70 In all these cases teaching took place in the prayers area, and when the four sects were accommodated in the same mosque-madrassa, this prayers area was subdivided into four iwans around the sahn. The first example known to have the four sects was the Mustansiriya School in Baghdad that dates back to the year 631 A.H.

Egypt was the first Muslim country that followed up this concept of uniting the four sects in one complex and this is best exemplified in the mosque of Sultan Hassan and Barquq.

FIG. 26 Sultan Hassan Mosque



- 71 We can have more than one prayers hall for other reasons than the different sects. For thermal comfort for instance.

In Nejd, the extreme heat in summer and cold in winter faced the builder with quite a trying problem for thermal comfort, in the absence of mechanical air-conditioning.

However, he solved this problem in quite an ingenious way by its very simplicity and directness of thought. He gave three prayers places in the same mosque instead of one: there was one at ground level, which is the normal prayers hall for normal weather conditions, a second one which is half sunk in the ground for extreme cold in winter and heat in summer at noon and afternoon prayers, and the third one is the terrace above this half-sunk hall open to the sky for the evening prayers, when the sun has set and the open-air temperature has dropped considerably to about 20°C.

Figs.  
28-29

- 72 This solution by its directness may hint to a comprehensive and new attitude for the designer with respect to the environment instead of jumping to the mechanical means which are not always available to people in the desert or in the country.
- 73 The prayers area having to be very large so as to accommodate the great numbers for the Friday prayers, has to be sub-divided by colonnades and arcades with appropriate spans to suite the construction methods and the building materials used.

In the past, these materials were limited to stone, brick or mud-brick with wooden or vaulted roofs. The limitations imposed by the structure using such materials ensured respect for the human scale, and the colonnades in rows harmonized with the rows of worshippers.



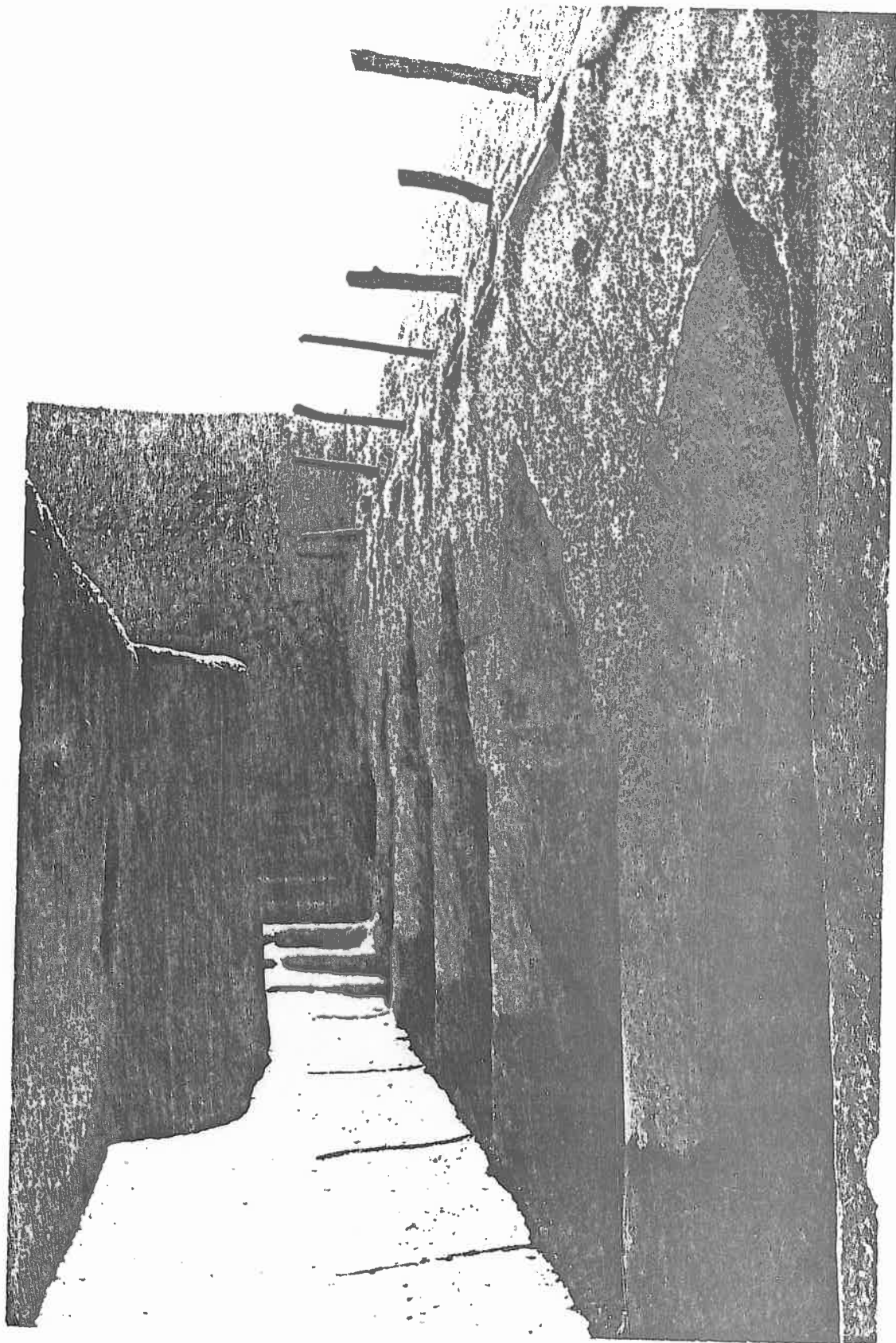


FIG. 28. Mosque in Dareya

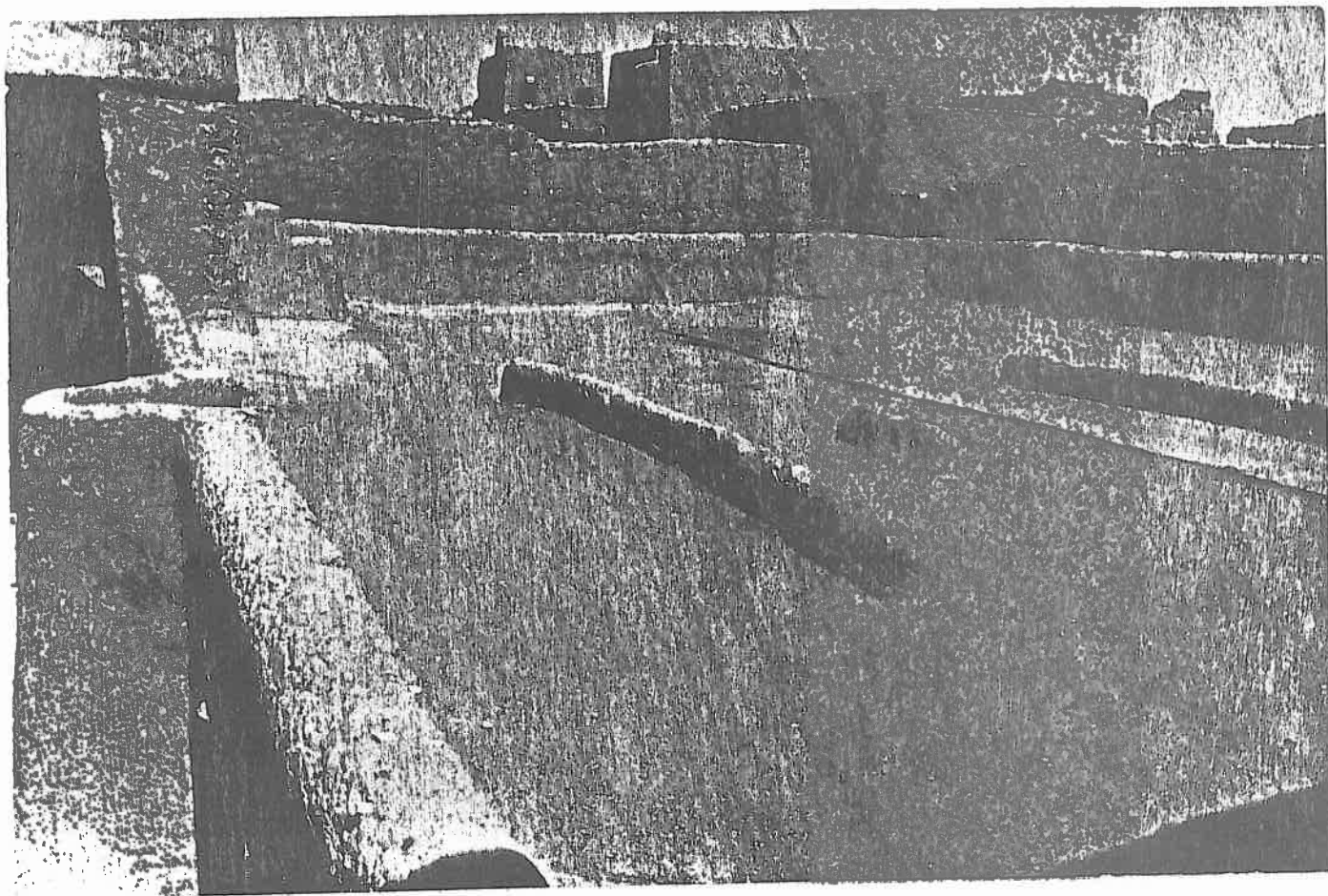


fig. 29. Mosque in Dareya  
Prayers area on roof

- 74 The prayers area provided place for resting and contemplating in between the times of prayers. The columns and piers here are very convenient for the worshippers to lean against while squatting or reading the Koran. In some cases shelves are installed in the shaft of the column to hold Korans as seen in Dareya near Riyadh in Saudi Arabia.

Fig. 30

Were the prayers area covered by one hyperbolic paraboloid shell, its descending body would have cut man from the sky more than if the roof were flat. The large, unpunctuated space in this case would make the worshipper feel lost by the lack of the human points of reference he used to have in traditional mosques.

- 75 An extreme case is presented by the mosque designed for the university of Baghdad, in which the total prayers area plus some landscape grounds around it are covered by one single concrete shell in the form of a turban - to make it Arab. In the first place, this dome is sitting on three points instead of the four oriented pillars carrying the celestial dome of the cosmic turtle, thus disorientating man, making of the structure a macro-farce instead of a micro-cosm. The eight angels carrying the Throne of God have five missing, forgetting that if man removed only one star, not five, from a constellation, the whole system would collapse.

Secondly, aesthetically speaking, this dome in the shape of a turban to be worn on the head, looks very strange on the floor, giving the feeling of waiting for someone to pick it up and put it on his head.

Fig. 31

### The Qibla

- 76 Besides giving the direction of the Qa'aba by the architectural design of the mosque, this direction is marked by the Qibla. It is a semi-circular niche covered by half a dome, with, to its right side the "mimbar" or pulpit for the Sheikh to give the Friday sermons.

Fig. 32

This niche reminds one of the recess in the walls of Pharaonic tombs and temples in the shape of a door wrongly named by archaeologists 'the false door'

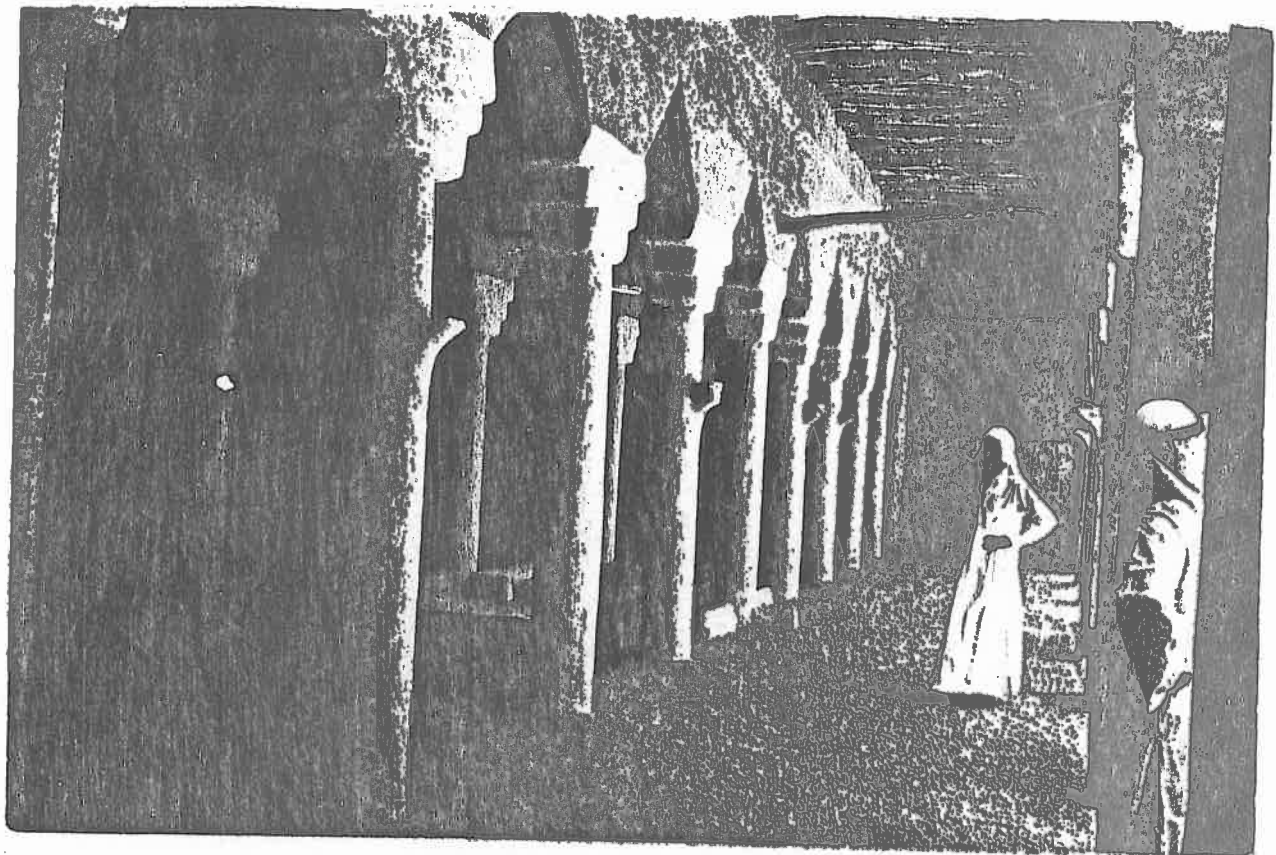


FIG. 30. Mosque of Dareya  
shelves on columns

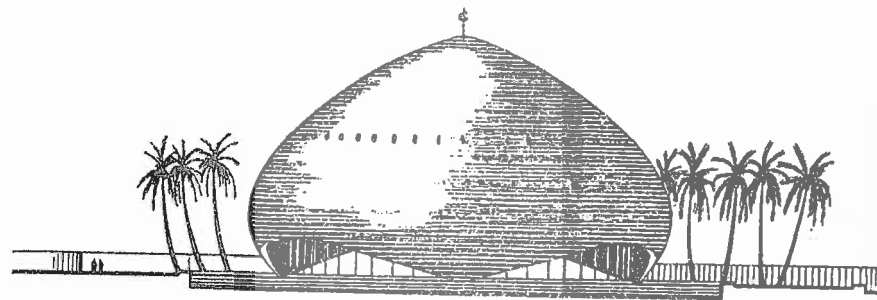
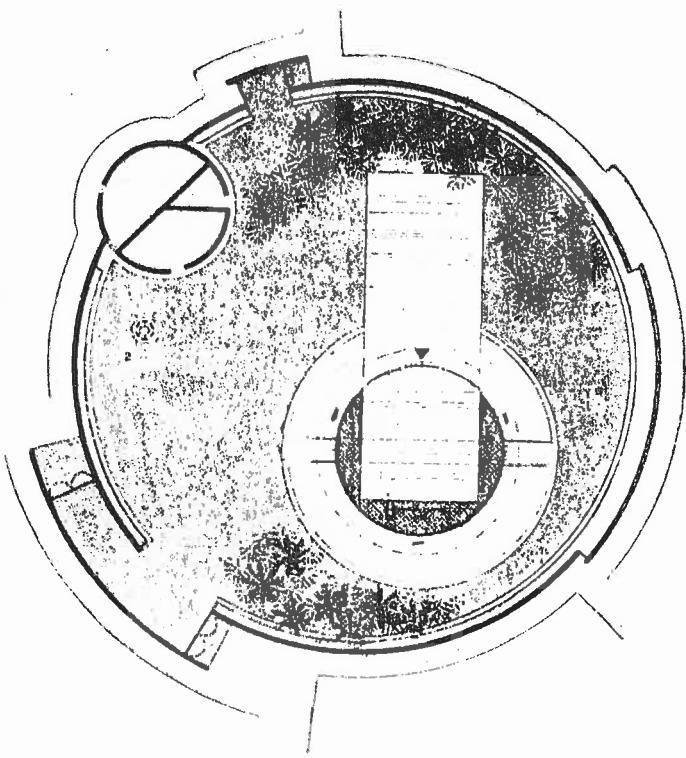
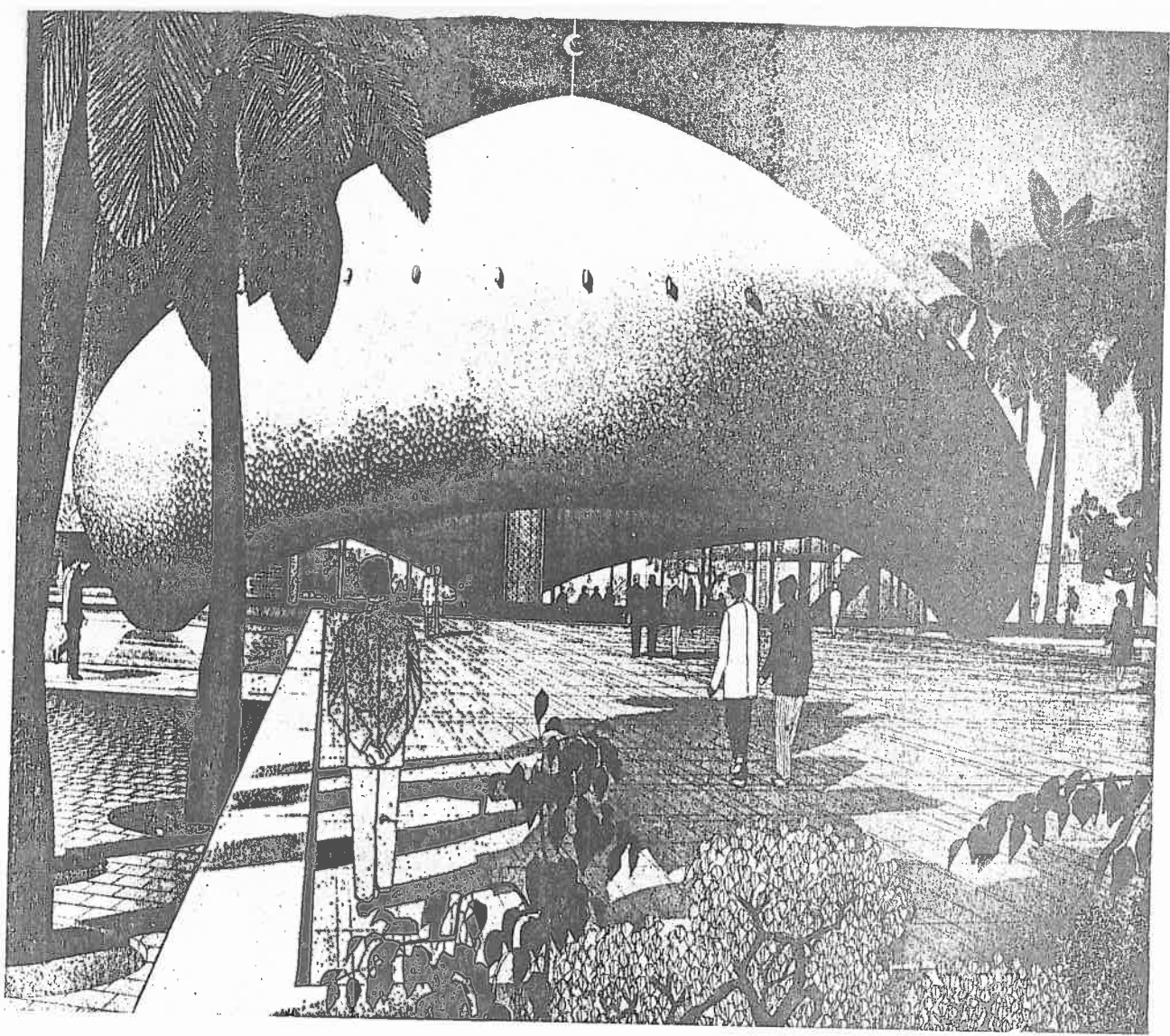


Fig. 81 Mosque of Baghdad University





FIG. 32 Qibla

because falsehood cannot be associated with religion. The proper name in Pharaonic is, 'the threshold of Eternity', for the soul of man to pass through. It is the same with the Qibla; if the worshipper could not reach the Qa'aba in Mecca with his body, he can reach it with his soul through this symbolic niche.

### The Crestings

- 77 To connect earth with the sky in the architecture of the mosque, the builder crowned the walls with crestings which had the quality of having the shape of their solid masses, a replica of the shape of the interstices that lie between each two of them, the solid mass of the cresting representing earth and the void representing the sky, or body and soul. The crestings were sometimes in the shape of geometrical crenellations.

Fig. 33

Often they were in the shape of tri-foil lily flowers. Fig. 34 In colloquial Arabic they are called "the brides of the sky".

- 78 The use of the tri-foil flower had a symbolic meaning which is explained in the Chinese philosophy of painting, as applied to the prune flower. When this flower is in bud, the calix has two parts symbolizing duality and separation between earth and sky, but as soon as the bud flowers, the calix would have three parts symbolizing earth joining sky and man being created to watch the miracle.
- 79 By means of these crestings the Arab architect realized the idea of earth joining the sky throughout the length of the wall inspite of the horizontality of this wall. By this interpenetration of mass and void at the individual scale of each cresting he symbolized contact between earth and sky at the individual level. In their being set in a row they symbolize the idea of equality of all mankind,

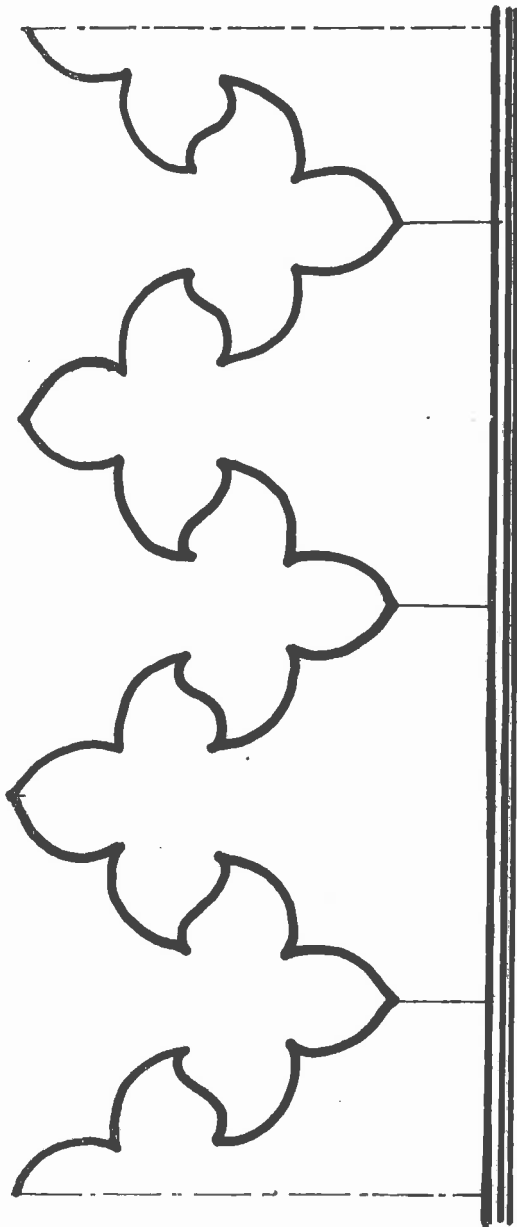


FIG. 34

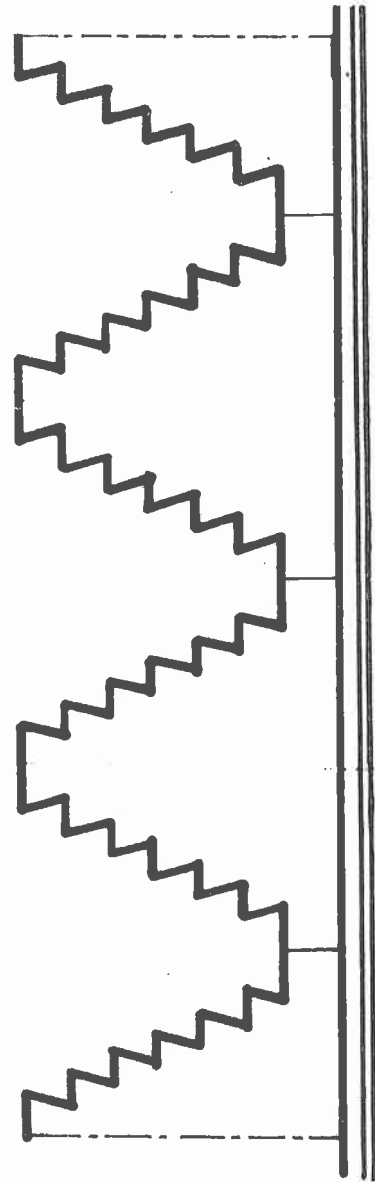


FIG. 33



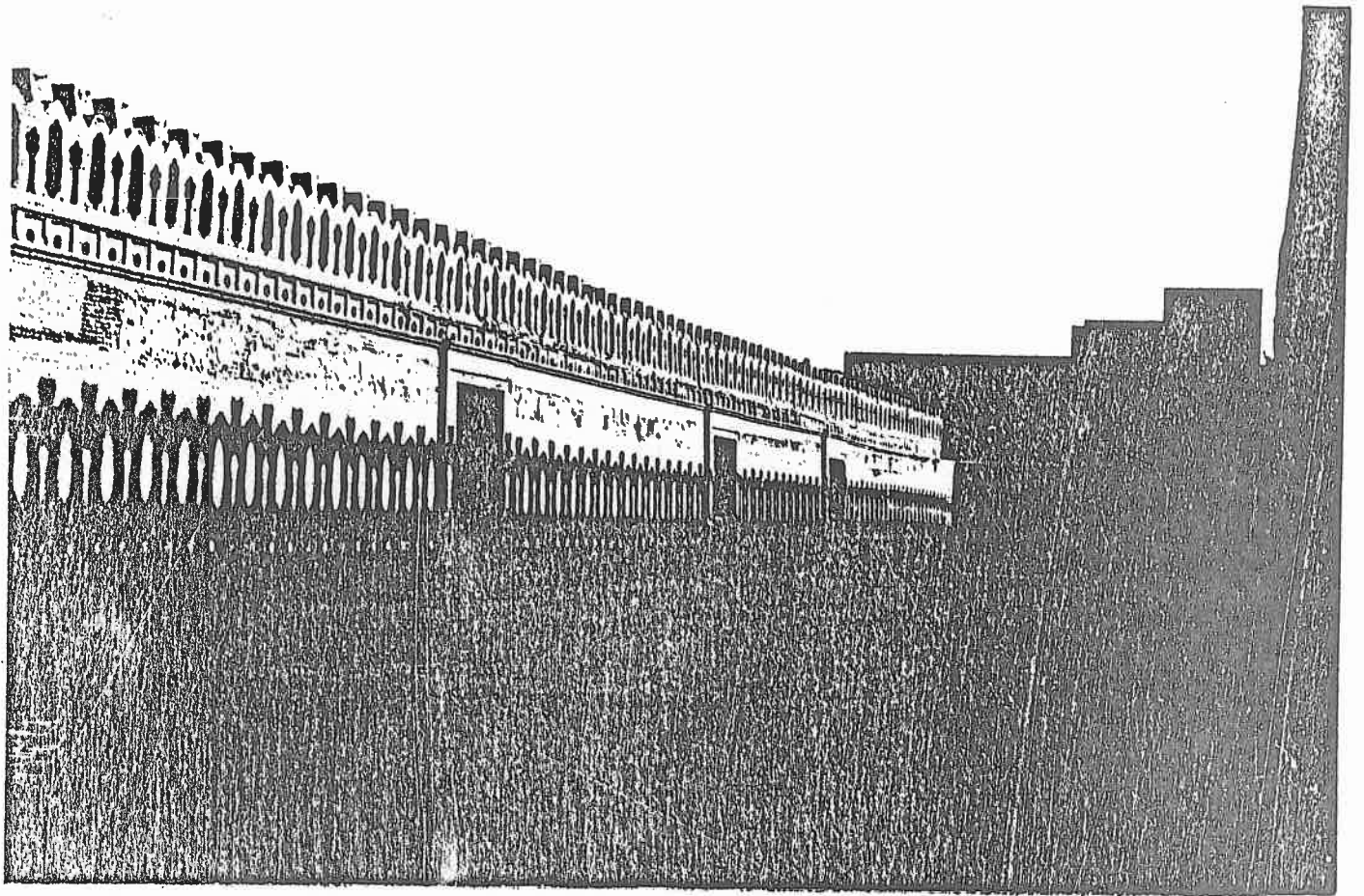


FIG. 35

illustrating the Hadith which says: to God all believers are equal like the teeth of a comb. In the mosque of Ibn Touloun in Cairo these crestings are in the form of men in a saff or row.

Fig. 35

### The Minaret

- 80 Aspiration towards the divine is expressed in mosque architecture by the minaret shooting up above the building in contrast with the horizontality of the facade. If the crestings symbolized earth meeting the sky at the individual level, the minaret symbolizes this contact at the communal level.

In the traditional Muslim city, the houses were not very high with the minarets shooting up much higher into the sky, allowing for the voice of the moazzin (the sheikh calling for prayers) to reach all the believers in the neighbourhood. The range his voice could reach may be considered as a factor in determining the size of a neighbourhood in town-planning. By analysis, it will be found corresponding and coinciding with the other determinants provided the moazzin is using his proper vocal chords (natural voice) without any artificial amplification and that he calls from the balconies on top of the minaret.

- 81 Using microphones would distort the situation and break the above-mentioned balance. Firstly, the microphone would widen the range of reach of the moazzin's voice, drawing more worshippers than the mosque can hold. Secondly, the moazzin does not need to call "Allah Akbar" (God is Great) from high up going round the minaret's balcony. He would call for the prayers sitting in a room in front of a microphone. This means the minaret loses its function and its *raison d'être* and becomes redundant. Thirdly, the sound of the microphone is harsh, metallic and inhuman, being amplified to the high pitch used. This vulgar sound greatly hurts the inhabitants in the close neighbourhood and the passers by, which is

against the teachings of the religion.

God created the ear of man to fit in with the natural sounds of animals and natural phenomena such as wind and thunder. Such sounds may be impressive but never so harsh and hurtful as the microphone at the pitch and the way it is being used nowadays.

- 82 To make the minaret lead vision upwards, the architect used the inherent qualities in the geometrical form in his design. Physiologically speaking, the eye does not see more than one point in any figure at any one time. In perceiving form, the visual experience is sent by the eye point after point to the brain where the image is constructed, just like in music where the melody is sent note after note and the ensemble composes this melody in the brain. Thus, rhythm and time are introduced in architecture, but this visual experience takes such a short time that one takes it to be instantaneous.

- 83 Applying this phenomenon to the architecture of the minaret, we can explain how the Muslim architect expressed movement upwards.

Taking the case of perceiving a vertical straight line, the eye would follow the component points one after the other up and down from end to end, without pointing to any direction.

Fig. 36a

However, if we marked this line with a number of marks, dividing it into several sections, each one shorter than the other as we went upwards, then the eye would move by inertia from the longer sections to the shorter, following up the direction giving the least resistance.

- 84 Now, if these sections were shortened in a rhythmical way, according to a logarithmic progression for

example, then we shall have specified a harmonious movement upwards in an acceleration similar to an accelerando in music.

Fig 36c

- 85 Taking two parallel vertical lines instead of one, then the confusion of the eye with regard to direction would be doubled, but immediately these two lines are set at an angle, the eye would follow them in the direction of their meeting point.

Fig. 36b

Fig. 36d

Dividing such a figure pointing upwards by horizontal lines into sections that are shortened as we go upwards, we shall have accentuated the acceleration upwards.

Fig. 36e

- 86 Examining the architecture of the highly developed minaret, we shall find these principles underlying the design concept. Most of them are divided into sections by means of balconies for the moazzin, with the same rhythmical shortening, and the tapering effect is produced by reducing the size of each section, section by section as we go upwards.

This effect is often accentuated by transforming the shape of these sections successively from the square to the octagonal to the cylindrical as we go upwards, thus adding to the acceleration.

Fig. 37a

- 87 Regarding these geometrical qualities together with the architectural and decorative features as applied to the design of the minaret, we find that the architect had brought his work nearer to sculpture than architecture by subjecting structure and technology to artistic expression.

- 88 The modern architect might understandably make abstraction of the symbolic decorative features in a classical minaret, but he should never overlook the expressive qualities inherent in the geometrical form.

There are so many examples of traditional minarets which are of abstract character, some of which are totally denuded from decorative or architectural details, as the one in the mosque in Siwa.

Fig. 37b

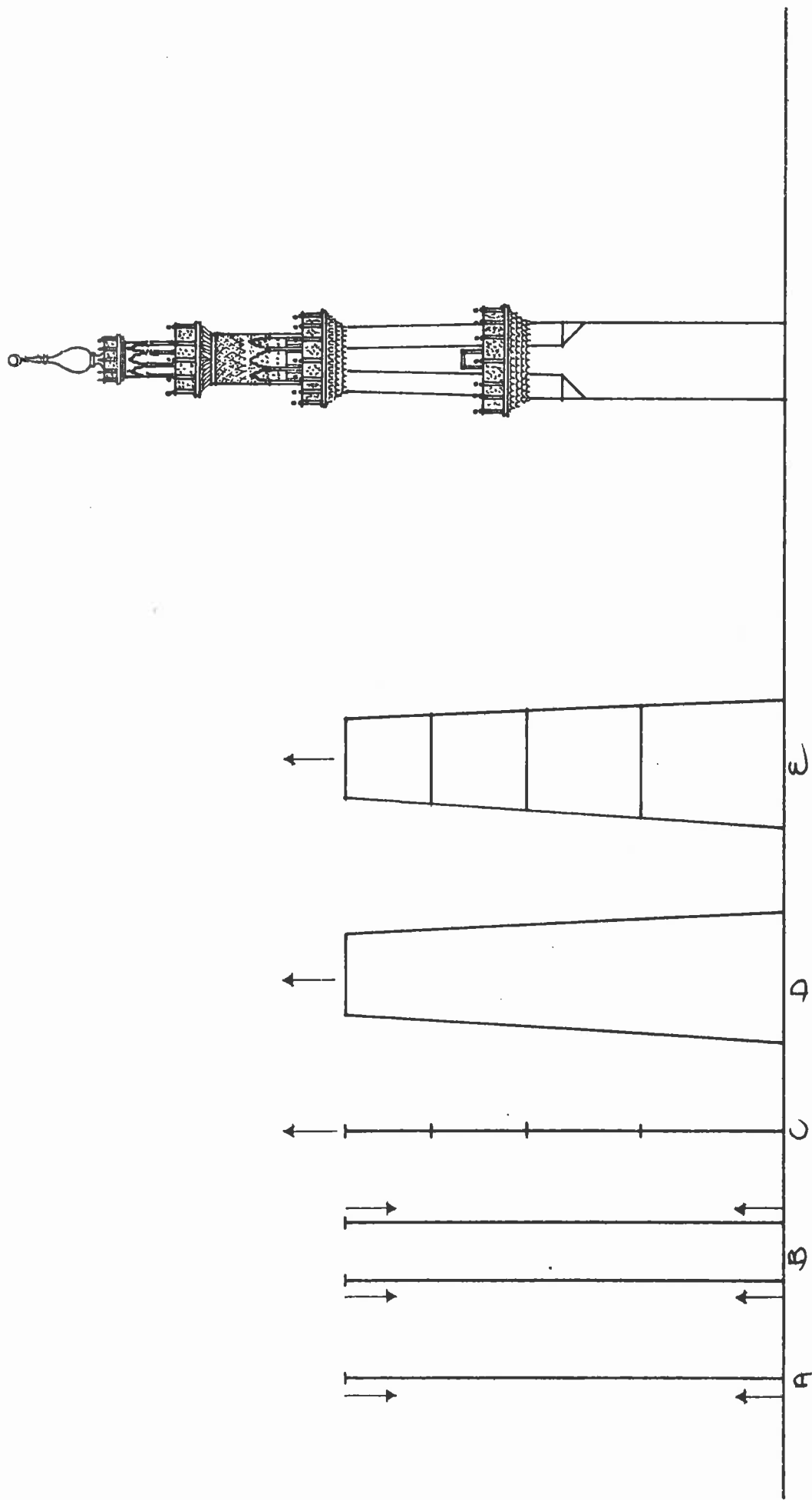


FIG. 36

(A-E) Harmonic Shortening according to a logarithmic progression.

FIG. 37

Harmonic Shortening according to the Golden Ratio

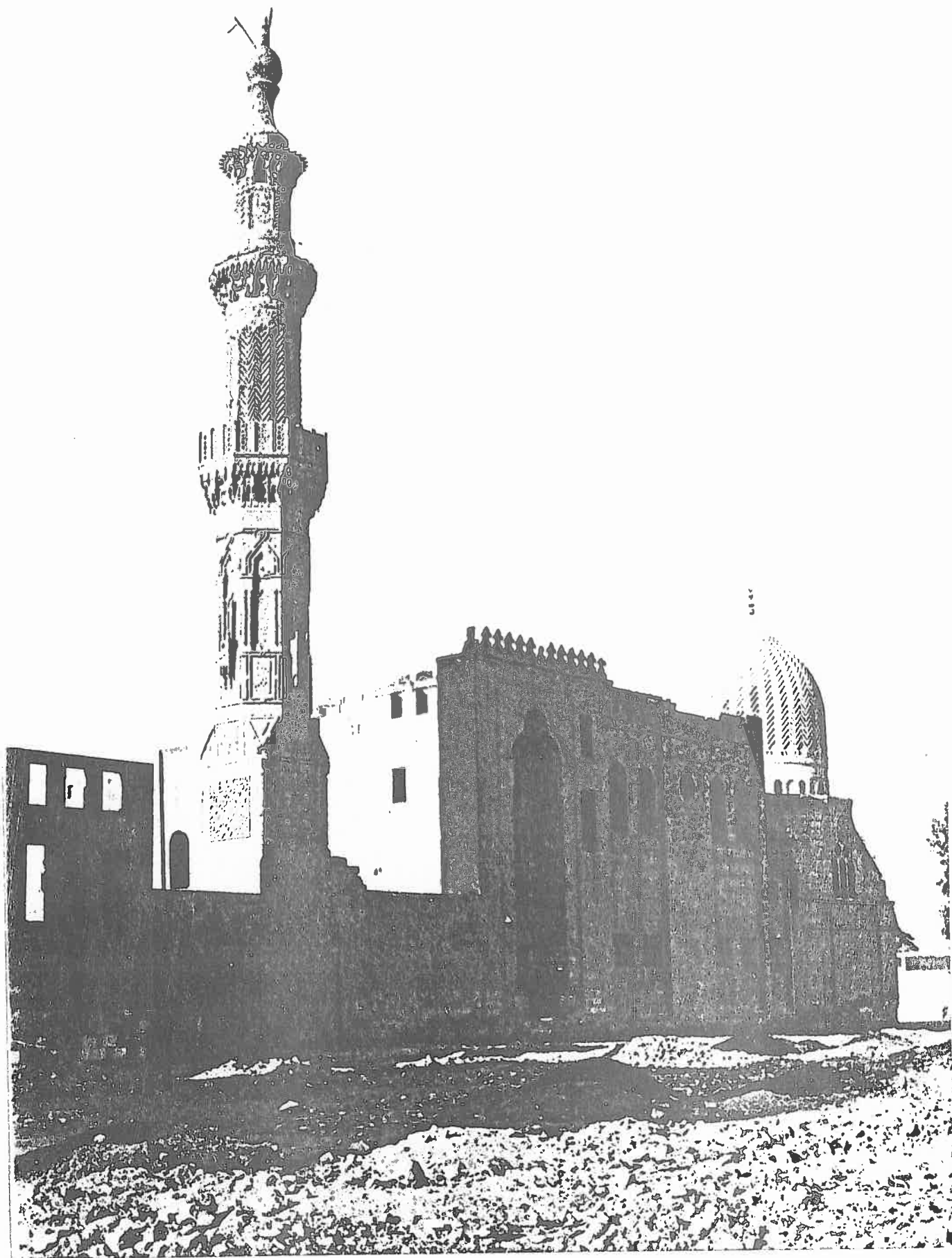


FIG. 37a.

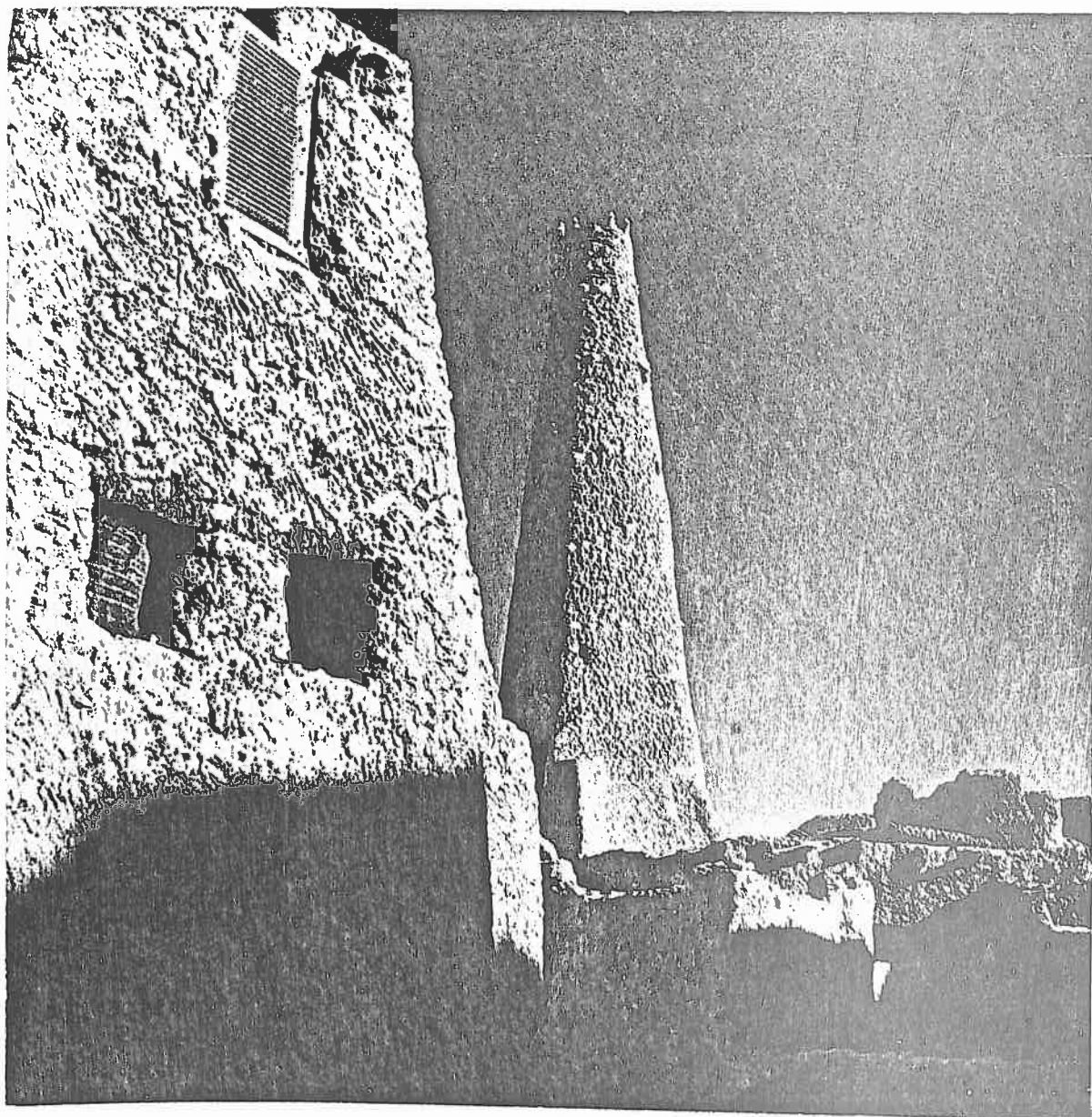


FIG. 37b Minaret in Sewa

To follow is a list of a few examples that may be profitably examined:-

- 1 Minaret of Jamin, Afghanistan
- 2 Qotb Minar, India
- 3 Minaret of Samarra, Iraq
- 4 Minaret of Ibn Touloun, Cairo
- 5 Minaret of Al Hakeem, Cairo
- 6 Minaret of El Gioushy, Cairo
- 7 Minaret of Qalaoun, CAiro
- 8 Minaret of Barquq, Cairo
- 9 Ghazna Massoud tower, Afghanistan
- 10 Minaret in Dareya, near Riyadh

For further study of minarets and other design features, one has to consult a comprehensive bibliography on Islamic architecture.

#### The Minaret in the Architectural Composition of the Mosque

- 89 The minaret should be placed in a position to make a comprehensive and aesthetic composition with the dome, both being the elements that go above the building, playing a major role in defining its silhouette against the sky.
- 90 The dome as seen looking upwards from inside expresses the sky, but seen from the exterior, it looks like a shell structure bending downwards, needing the minaret in the composition to correct this effect. This can best be exemplified in St. Sophia in Constantinople before and after it was transformed into a mosque.

Fig. 38

Before, the whole building expressed completeness in itself, cut off from the sky. After the minarets were added, the building joined the sky.

Fig. 39

This reminds us of a Hadith or saying of the Prophet Mohammad which goes as follows:-

A man questioned the Prophet saying, 'What is life and what is hope?' In answer, the Prophet took his



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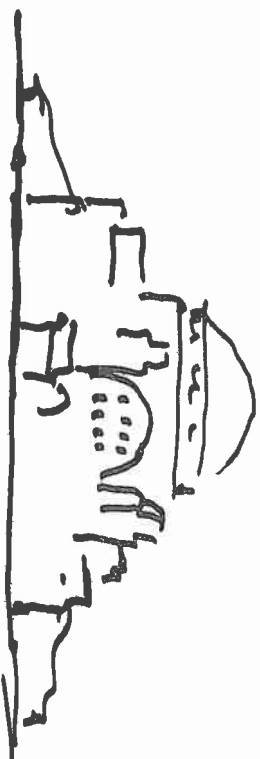


FIG. 38



FIG. 39

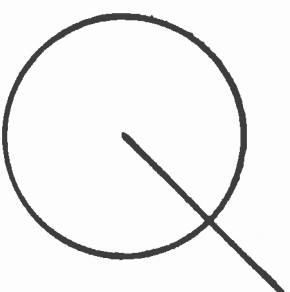


FIG. 40

stick and drew with it a circle on the ground saying, 'This is life' and he drew a straight line going from inside the circle and crossing the circumference beyond it saying, 'And this is hope'.

Fig. 40

- 91 So the designer should pay great attention to where he places the minaret in the composition with relation to the dome, taking inspiration from nature, as for example, when he notices how beautifully the palm tree matches the dome and composes well with it.

#### The building materials of the Mosque

- 92 Before entering into this subject we have to give this warning. No factitious element or material should be tolerated in any religious building, as unfortunately, is seen in so many examples with plaster simulating stone. This falsity is never seen in traditional mosques, where, if in stone, the architecture is stone architecture and decorative elements express plaster and never imitate stone. We have a good example in the mosque of Ibn Touloun in Cairo, and Samarra in Iraq.
- 93 Building materials age differently, each with its own way of wearing and taking dust, and the buildings themselves age accordingly differently. Some age with dignity and some age very badly. Whenever the architecture is true to the material, the building usually ages beautifully, but where plaster or artificial stone is used simulating real stone, the result is always degrading to the architecture. Firstly, the dust usually collects at the wrinkles of the buildings, in the critical places such as the mortar joints, the cornices, the stalactites and the decorative patters, drawing the attention of the beholder to these places.
- 94 These elements are originally conceived in the specific material in which they were first created, and they bear the imprint of the constraints imposed by the materials used, and the marks of the tools

with which they are manufactured. A carved element in stone is quite different in character from one cast in plaster or concrete, and the dust collecting at these strategic points bring out loudly the falsehood, making the building more and more ugly with time.

- 95 Certain mosques with factitious plaster that were built in Cairo no more than ten years ago, look now very shabby, dusty and unholy, while old mosques built in real stone like Sultan Hassan, or with plaster architecture, like the mosque of Ibn Touloun that were built hundreds of years ago, did not lose any of their beauty and dignity.
- 96 To mention an example about the care for truth in the use of building materials in sacred buildings. Materials were chosen and used in the different places in the structure according to their symbolic value. If the architect had to use mud-brick for any part of the building which should be in mud for the sake of the symbol, he would never use stone or granite in its place, however easily they could be obtained.
- 97 For example, the ancient Egyptians used mud-brick in the foundations of the huge temple columns, because mud symbolizes the union between water and earth, and the column is lotiform or papyriform, that is, expressing the plant that grows from mud and water. Although this may seem to go against the dictates of modern engineering, yet these columns are still standing after more than three thousand years. The point in bringing in this example is not for its structural aspect, but to show how the Pharaohs respected symbolic value and truth in using materials, even though the element was hidden from view.
- 98 Another interesting case we find in the right-hand colossus of Ramses II in front of the pylon at the temple of Luxor. It is a monolith of black granite except for the crown which is in red granite, the red being the symbolic colour of lower Egypt. For

this they chose a place in the quarry of black granite which had a vein of red granite, and they sculptured this huge monolithic statue in such a way as to have just the crown to fall in the vein of red granite.

- 99 They did not take the easy way out and paint the crown red, or carve the crown separately in red granite and stick it on Pharaoh's head later.

#### A Proposed Module for the Plan

- 100 A worshipper would normally take a space for praying 0.55 ms. wide by 1.4 ms. long. Therefore, the length of rows is to be a multiple of 0.55 ms., and the distance between each two rows will be a multiple of 1.4 ms. Thus, a module of 4.40 ms. may be adopted in the design of the plan for the mosque.

This would facilitate the structural problem of covering either with flat or arched roofs. In this case, each bay would accommodate 24 worshippers.

Fig. 41

## The Mosque in the Town Plan

- 101 In the traditional Muslim city, the mosque takes the place of honour amongst the secular buildings. In Fatimid and Mameluk Cairo, they are landmarks and focal points in the street and the silhouettes of the quarters because of their minarets and their positioning in the town plan.

If the entrance of the mosque were to recede from the profanity of the street as described before, the building itself as a whole is made outstanding in the street plan. This effect is produced by having the facade slightly rebated by following the meandering alignment of the street, as in the case of Sultan Hassan, or, by having the building protruding into the street forming a corner like in the mosque of Dardiri, thus forming accidentals in the town plan.

Fig. 42

- 102 These accidentals may have been created unconsciously or, they may be a result of a will to give the mosque an outstanding place in the street. Whatever the reason may be, the modern architect and town-planner have to take note of that and try to reproduce this effect in their town-planning and architectural designs not just from the religious point of view but also from the aesthetic, animating the otherwise dull town-scape of the gridiron town plan.

Mosques of the Mameluk and the Turkish periods in Cairo used to have drinking fountains with loggias on top which were used as classrooms or "kuttabs". These fountains by nature have to be sticking out forming a common feature in the traditional Cairene town-scape.



FIG 42 Dardini Mosque



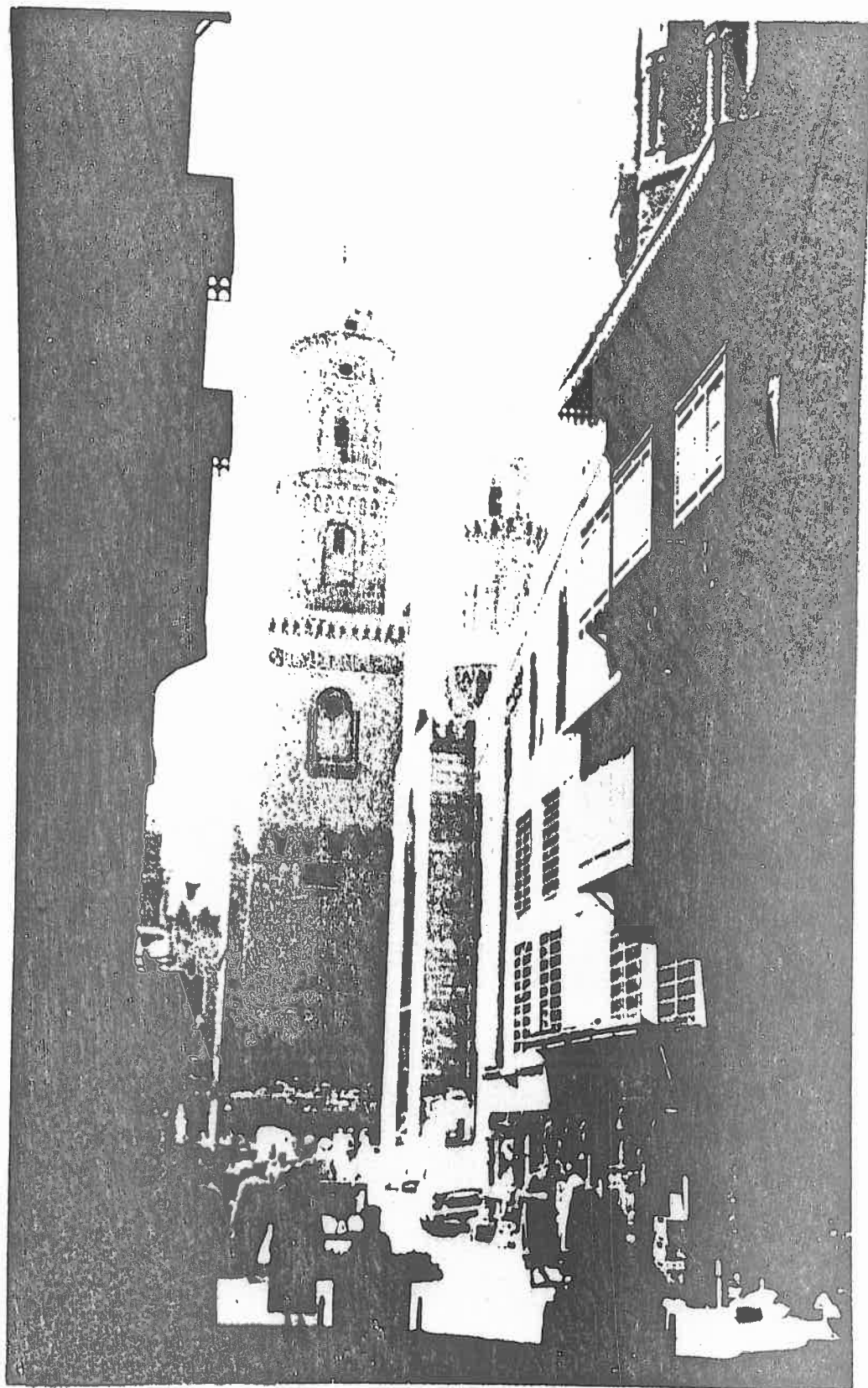


FIG. 42.b

## Glossary

Djameh	collective mosque for the Friday prayers
Imam	leader in the prayers who delivers the Friday sermon
Khelwa	cell for meditation
Kuttab	classroom usually placed on top of the sabil for teaching the Koran
Maazana	minaret
Magaz	entrance with offset
Masdjed	mosque for the quarter
Meida	ablutionary
Mimbar	pulpit from top of which the Imam gives the Friday sermon
Moazzin	sheikh calling for the prayers from top of a minaret
Qibla	niche indicating the direction of Mecca
Rowak	part of the prayers area used for learning and praying for a certain sect
Sabil	drinking fountain
Sahn	courtyard
Zawya	a small corner mosque. Zawya means corner or angle.